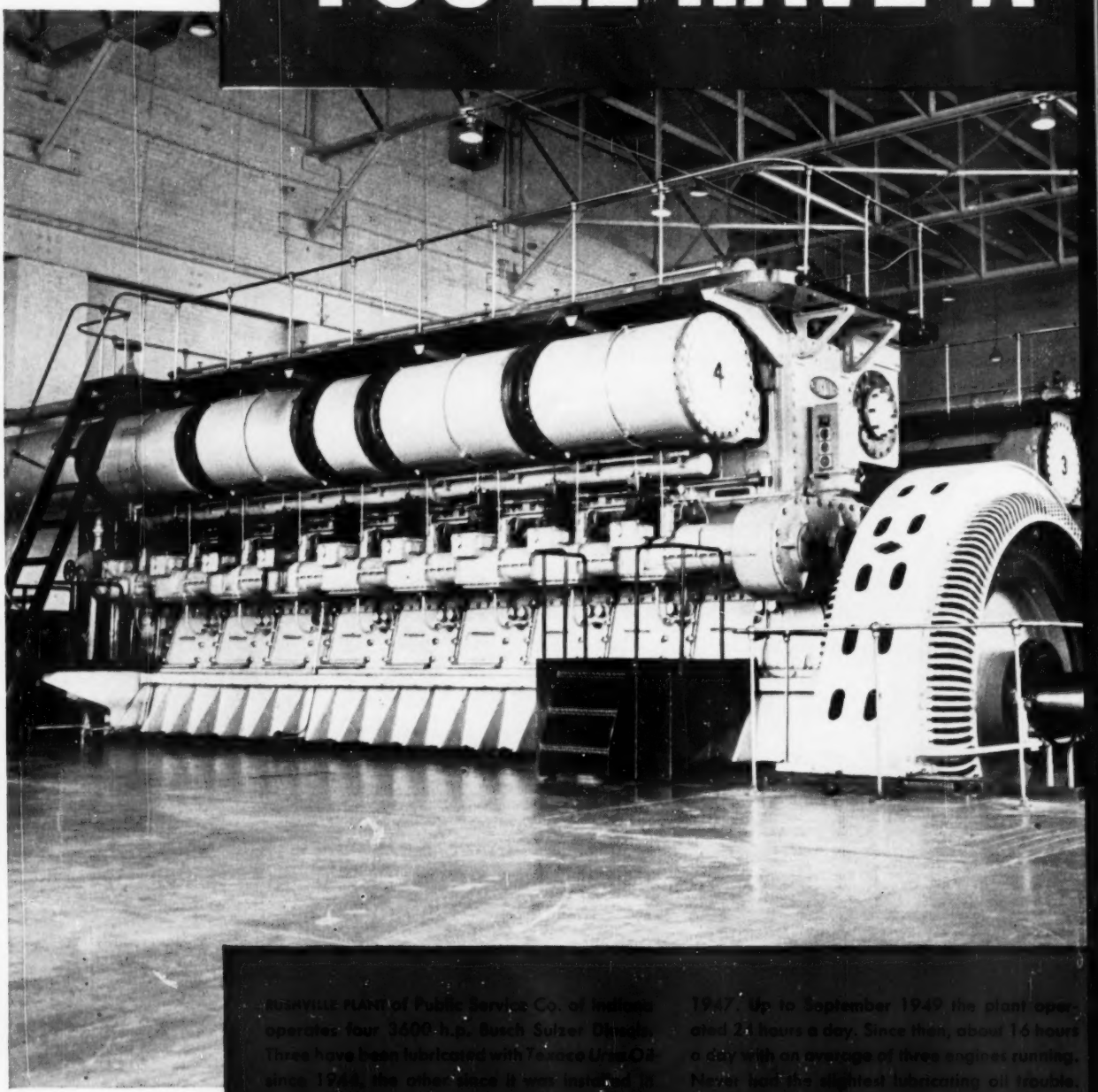
DIESEL POWER

AND DIESEL TRANSPORTATION

DECEMBER, 1952

YOU'LL HAVE A "



...RSVILLE PLANT of Public Service Co. of Indiana operates four 3600-h.p. Busch Sulzer Diesels. Three have been lubricated with Texaco Ursa Oil since 1948, the other since it was installed in 1947. Up to September 1949 the plant operated 24 hours a day. Since then, about 16 hours a day with an average of three engines running. Never has the slightest lubricating oil trouble.

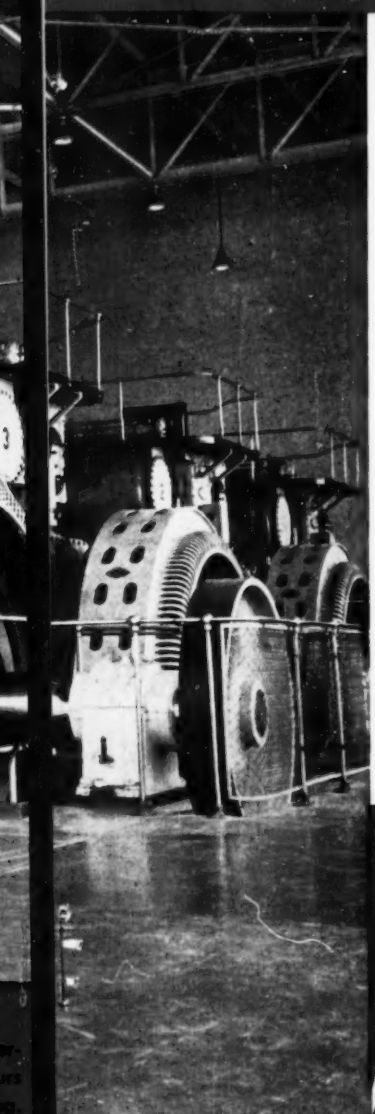
TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE, on television Tuesday nights. METROPOLITAN OPERA radio broadcasts Saturday afternoons.

TEXACO

TEXACO

DIESEL POWER and DIESEL TRANSPORTATION for Dec., 1952, Vol. XXX, No. 12. It is published monthly by Diesel Publications, Inc., Orange, Conn. Executive and Editorial offices at 192 Lexington Ave., New York 16, N. Y. Subscription rate: United States, $3.00 per year, single copies 35¢; Canada $4.00. Foreign $5.00 per year. Entered as second class matter April 29, 1949 at the Post Office, Orange, Connecticut under Act of March 3, 1879.

"FREE-RING CIRCUS"



"No ring trouble in the 8 years we've been using TEXACO URSA OIL,"

reports Public Service Co. of Indiana

Proper seal for each and every ring — that's what you get, gentlemen, when you use *Texaco Ursa Oil* in your Diesel, gas or dual-fuel engines. It's the greatest "ring-master" in the business. Step right up and see how *Texaco Ursa Oil* keeps rings free in their grooves . . . "cracks the whip" on oxidation, carbon and gum. Marvel at the way it stands up under heat and pressure!

That's only the beginning! These stellar feats of *Texaco Ursa Oil* mean better compression and combustion . . . full power . . . less fuel consumption. All this, *plus* longer parts life and lower maintenance costs!

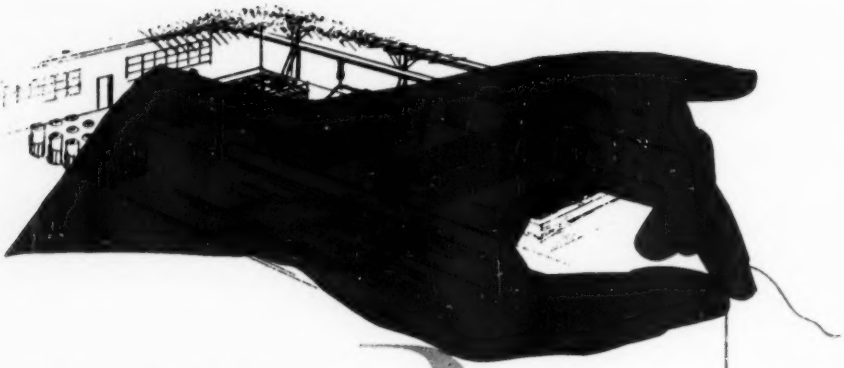
Climb on the Texaco bandwagon for spectacular savings. There is a *Texaco Ursa Oil* for every type and size of engine, for every operating condition. That's why—

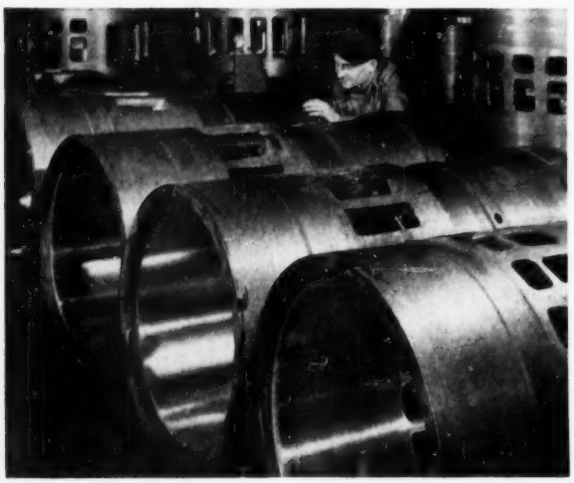
For over 15 years, more stationary Diesel h.p. in the U.S. has been lubricated with Texaco than with any other brand.

A Texaco Lubrication Engineer will gladly help you get greater efficiency and economy through effective lubrication. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

Faithfully yours 50 *for Fifty Years*





Replace the Atom!

Atoms disappear from the working surfaces of expensive Diesel liners until they are reduced to scrap. Worn out, you say? Let Van der Horst replace the atoms and your liners (or compressor cylinders) are new again.

We use VANDERLOY M, an electrolytic iron with a bond that's stronger than most cylinder metals. Atom by atom, we plate it to whatever thickness may be needed to renew the bore.

Then we finish-plate with PORUS-KROME*—which keeps its atoms on the job as much as four times longer than the kind they replace.

These superior Van der Horst atoms cost less than buying new parts. May we quote you?

W52-2D

* *PORUS-KROME is a dense, hard, wear and corrosion-resistant chromium, produced by the Van der Horst Corporation of America, and which gives working surfaces an infinite number of tiny oil-retaining reservoirs for perfected lubrication.*

U. S. PATENTS 2,048,578, 2,314,604 and 2,412,698

VAN DER HORST

VAN DER HORST CORPORATION • OLEAN, N. Y.

Commerce Cuts Costs

Texas Power Plant Reduces Fuel Costs 72%

with **NORDBERG DUAFUEL ENGINE**

and

BENDIX

FUEL INJECTION EQUIPMENT

The Municipal power plant at Commerce, Texas, an attractive city of 6000 population about 70 miles northeast of Dallas, faced a two-fold problem. Load capacities were increasing sharply and costs of power production with oil burning engines were high.

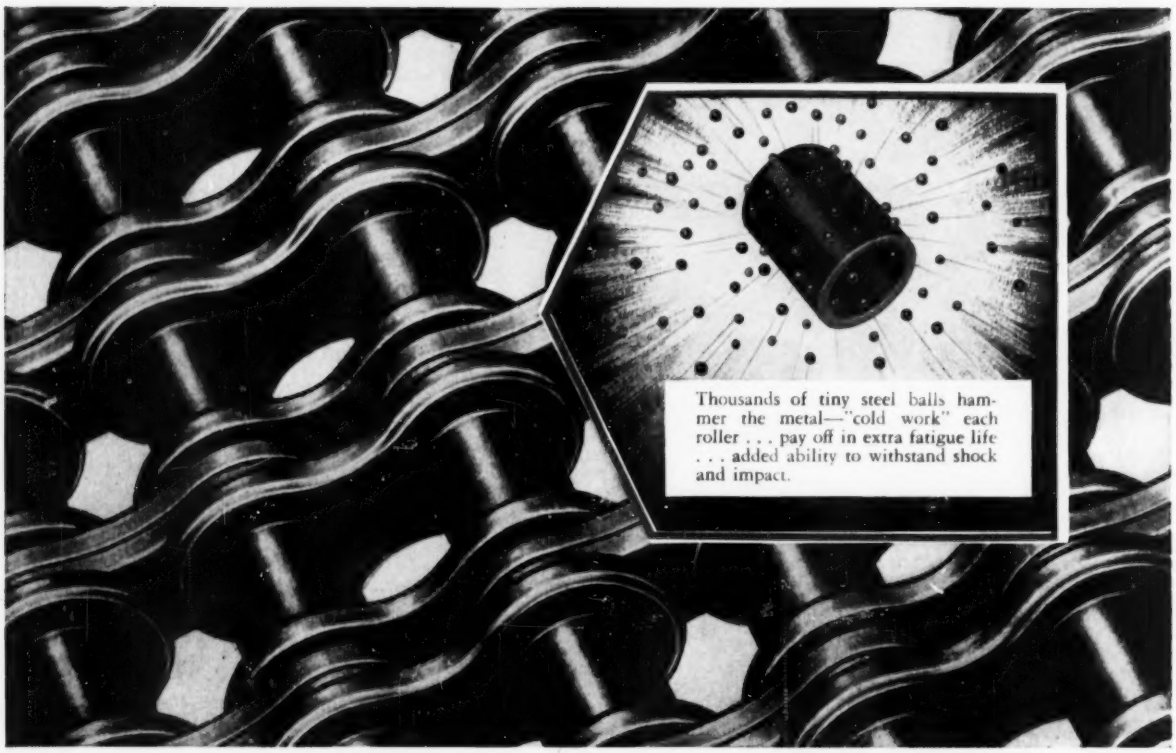
To provide the additional capacity required, and at the same time take advantage of available low cost natural gas, the city installed a 1200 h.p. Nordberg supercharged duafuel engine with Bendix Fuel Injection equipment. Fuel costs then dropped to 2.70 mills a kilowatt hour or better than 72%, a saving of over $11,000 in the first six months.

More and more cost conscious operators are installing Bendix equipped diesel power plants because Bendix is long experienced in working with diesel manufacturers in achieving maximum performance with low operating costs.

SCINTILLA MAGNETO DIVISION of Bendix AVIATION CORPORATION
SIDNEY, NEW YORK

Western Market Office: 582 Market Street, San Francisco, Calif. • Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

Get the roller chain that gives you SHOT-PEENED rollers...


Thousands of tiny steel balls hammer the metal—"cold work" each roller . . . pay off in extra fatigue life . . . added ability to withstand shock and impact.

look for the darkened rollers!

THERE are sound reasons for the universal acceptance of Link-Belt Precision Steel Roller Chain. Two of them—shot-peened rollers and Lock-type Bushings—are shown here.

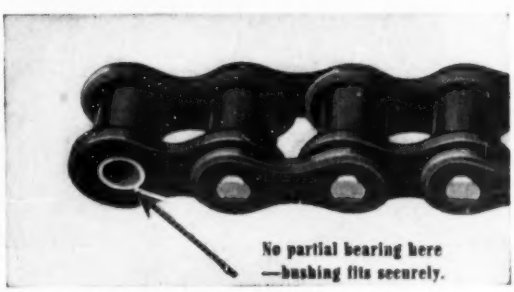
Others include Link-Belt's rigid material selection and controlled heat treating—your assurance of absolute uniformity with no weak members.

Whether it's for drive or conveyor service, you can get the best in roller chain from the complete Link-Belt line—single and multiple widths, in ⅜" through 3", and double pitch, 1" through 3". Next time you need roller chain, call the Link-Belt office near you.

LINK-BELT

PRECISION STEEL ROLLER CHAIN

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities. 52,097

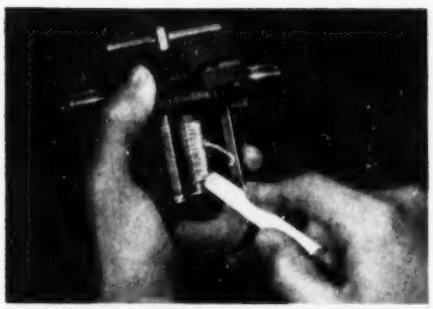


Lock-type Bushings increase ability to withstand shock loads

A special manufacturing process securely locks the inside sidebars on the bushing, preventing lateral movement of the sidebars and eliminating a common cause of stiff chains. This Link-Belt development is applied on roller chains through 1" pitch and double pitch roller chains through 2" pitch.

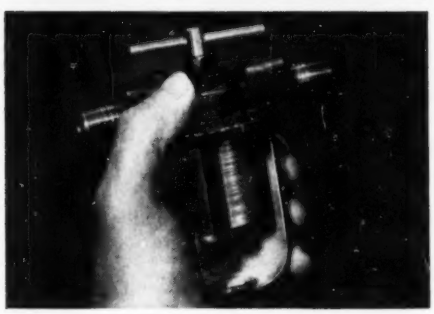
Here's how this strainer "combs" itself clean!

This simple chalk test shows how AUTO-KLEAN's unique built-in comb construction cleans the strainer without costly interruption of flow



ORDINARY BLACKBOARD CHALK leaves heavy deposit of chalk particles on and between discs of Cuno AUTO-KLEAN strainer.

TURNING HANDLE ONE REVOLUTION moves strainer element through comb blades, removing all traces of chalk from between discs. Cuno's exclusive combing operation cleans *thoroughly* —without stopping flow.



FILTERING AREA IS COMPLETELY CLEAN, restoring full initial capacity. All chalk particles and dirt fall to bottom of housing where they can be drained periodically.

- AUTO-KLEAN's permanent metal filter element is available in steel, brass, or stainless steel for long, trouble-free service.
- AUTO-KLEAN is adaptable to any fluid-flow system.
- From acids to tar . . . if you can pump it, Cuno can filter it. Capacities range from one gallon per hour to 15,000 gallons per minute.

CUNO **ENGINEERED FILTRATION**

Removes More Sizes of Solids From More Kinds of Fluids

AUTO-KLEAN (disc-type) • MICRO-KLEAN (fibre cartridge) • FLO-KLEAN (wire-wound)

SINGLE-STRAINER FLUID PROTECTION FOR DIESEL ENGINES

Continuously cleanable AUTO-KLEAN eliminates need for stand-by strainers

Sludge and other contaminants are easily gotten rid of when *all* the lubricating oil is sent through Cuno AUTO-KLEAN strainers. AUTO-KLEAN's compact construction provides this *full-flow* fluid protection in space which would limit ordinary filters to by-pass service.

The low pressure drop of AUTO-KLEAN strainers permits full-flow service on gravity, low pressure, or suction lines, with no loss in operating efficiency.

Cuno's exclusive "comb-clean" action provides *complete* cleaning of the filter element—without stopping fluid flow. Thus there's no need for a stand-by strainer.

The low maintenance costs of the AUTO-KLEAN save you money, for there are no cartridges to change. An occasional rotation of the handle does the cleaning job (most units can be equipped with motor drives for continuous cleaning).

Fixed-space metal discs in this modern strainer positively remove all solids larger than the specified disc spacing—from .0035" up to .062".

For permanent, positive Diesel protection, install compact Cuno AUTO-KLEAN—the precision-built strainer. Send the coupon for free bulletin.

A 3.1

Cuno Engineering Corporation
Dept. 251A, South Vine Street, Meriden, Conn.

Please send me bulletin on Cuno AUTO-KLEAN for Diesel engine protection.

Name.....

Company.....

Address.....

City.....Zone....State.....

P&H Diesel Engines

(2-CYCLE)

Can your diesels tie this for Turbulence?

See those intake ports? . . . how they're machined at a compound angle? That's the basis of P&H's exclusive "Whirl-air" intake. As the piston clears these ports on its down stroke, air rushes through the ports, developing a whirlwind within the cylinder that picks up atomized fuel for the effective 2-cycle expansion stroke.

Here's turbulence at its best. More complete atomization — more complete combustion — more thorough scavenging of burned gases. More power!

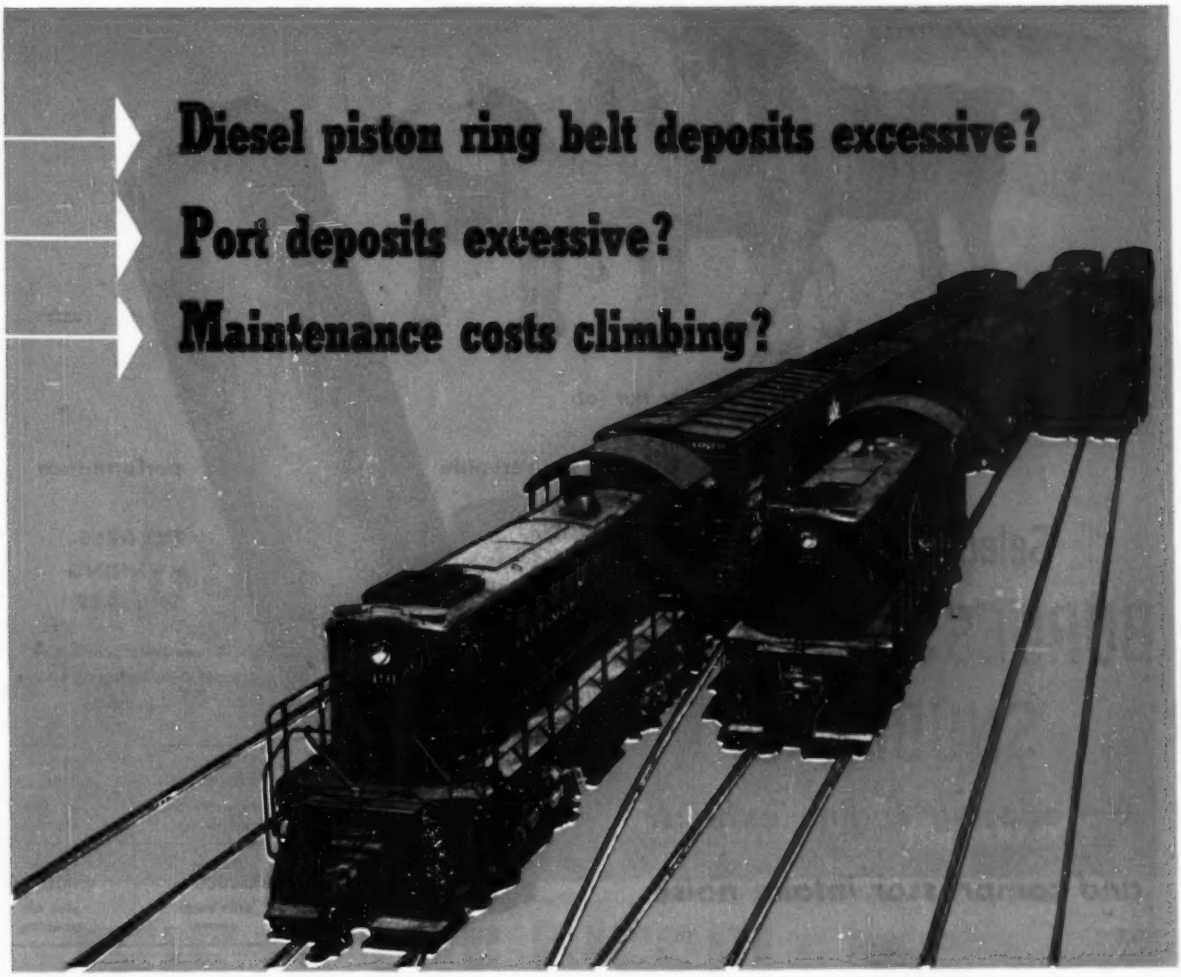
P&H offers you the only 2-cycle diesels with this outstanding feature. Yet, it's only one of many advantages you'll find in this advanced P&H line . . . with 1, 2, 3, 4 and 6-cylinder models — from 20 to 138 h.p.

Ask your P&H Diesel representative for full details. Or write us.

"WHIRL-AIR" INTAKE PORTS

P&H DIESEL DIVISION
HARNISCHFEGER CORPORATION
CRYSTAL LAKE, ILLINOIS

the P&H *Line*



You can reduce all three with GULF DIESELMOTIVE OIL

Gulf Dieselmotive Oil is ideal for railway Diesel engines—protects against the accumulation of deposits on compression and oil control rings, and in ports. It's especially effective for engines with high power ratings and for use with fuels containing cracked materials or sulphur: Here's why!

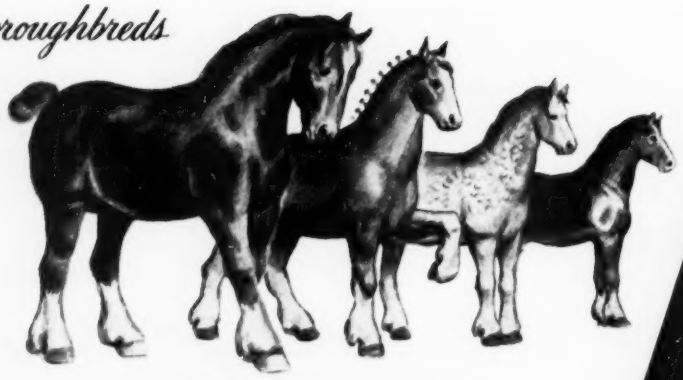
1. Has effective detergent action.
2. Made from 100% solvent refined oil.
3. Does not form hard metal-like deposits on piston crowns.
4. Is oxidation inhibited.

Call in a Gulf Sales Engineer and ask him to recommend the proper grade of this quality lubricant to improve lubrication and reduce maintenance costs for your Diesel locomotives. Write, wire, or phone your nearest Gulf office today.

GULF

Gulf Oil Corporation · Gulf Refining Company · Pittsburgh 30, Pa.

Thoroughbreds



work horses bred for the job

Snubbers... designed for versatile performance

Select dependable BURGESS-MANNING SNUBBERS

for reducing engine exhaust and compressor intake noise

BURGESS-MANNING SNUBBER

A versatile product to meet the changing needs of industry

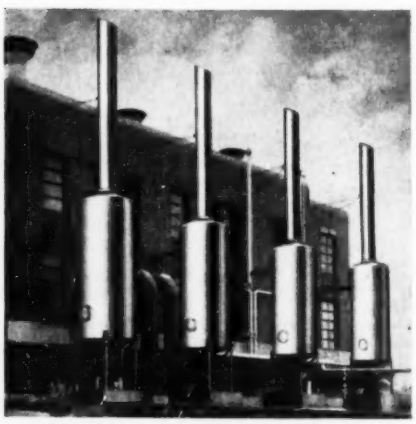
NOISE REDUCTION plus waste heat utilization	**NOISE REDUCTION** plus spark arresting
NOISE REDUCTION plus surge control	**NOISE REDUCTION** plus air cleaning

NOISE REDUCTION plus water separating

Just as thoroughbred work horses are bred to do specific jobs, so are Burgess-Manning Snubbers designed for specific performance in effectively reducing noisy engine exhausts and compressor intakes. These Snubbers smooth the flow of exhaust gases and intake air to reduce noise to the desired sound level without affecting performance. In addition to noise reduction, these versatile Burgess-Manning Snubbers perform such functions as waste heat utilization, spark arresting, surge control, air cleaning and water separation.

The standard line of Burgess-Manning Snubbers is available to meet the exacting noise reduction and special functional requirements of your Diesel and gas engines, jets, turbines, blowers, compressors and vacuum pumps. These Snubbers do a "work horse" job safely and dependably.

Burgess-Manning engineers also have the know-how to solve noise reduction problems on special applications for which standard equipment is modified. The broad line of standard and special Snubbers allows us to recommend the most suitable unit for your specific application. For complete information, write the Burgess-Manning Company.



Diesel Electric Power Plant at Marshalltown, Iowa, equipped with high performance Burgess-Manning Snubbers.

BURGESS-MANNING COMPANY

749-B East Park Avenue
LIBERTYVILLE, ILLINOIS

Chicago, Illinois **Dallas, Texas**

In one 8-hour day this GM Diesel-powered Le Tourneau Tournapull can dig, haul and spread the amount of dirt removed in digging 8 or 10 average home basements.

THIS IS THE DIESEL

for any job from 32 H. P. up

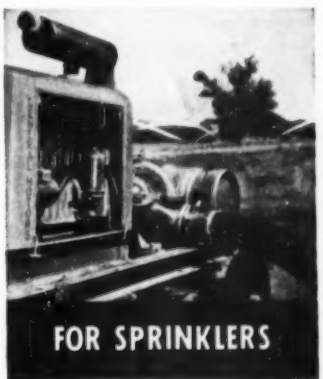
Don't let the small size of this General Motors Diesel engine fool you. It's ready to take on any heavy-duty job from 32 H.P. up—and get more work done at lower cost than any other engine, Diesel and gasoline included.

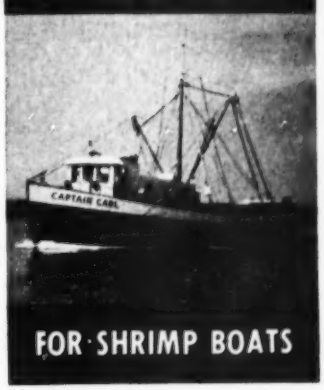
In GM Diesel engines *every* piston downstroke is a power stroke—not every second downstroke as in most engines. This makes GM Diesels more compact, with more horsepower for their size. It gives them more "pep," faster acceleration, smoother power.

The GM Diesel starts instantly on its own fuel. Simplified design makes maintenance easier. And rugged, top-quality construction with interchangeable parts insures years of low-cost service.

We merely ask that you inspect these great engines and judge for yourself. They're available in more than 750 different models of equipment. Write us for the list of applications or see your nearest GM Diesel distributor.

Single Engines . . . 32 to 275 H.P. Multiple Units . . . Up to 840 H.P.





DETROIT DIESEL
ENGINE DIVISION

GENERAL MOTORS • DETROIT 28, MICHIGAN

In Canada: General Motors Diesel, Ltd., London, Ontario

GM GENERAL MOTORS DIESEL POWER

23 YEARS

AND MANY REPEAT ORDERS LATER

Cities Service Gas Co. — first user of AAF automatic air filters for engine intakes — again specifies Multi-Duty's proven protection

A lot of dust has blown across the Texas Panhandle since 1929—the year Cities Service Gas Co. installed their first Automatic Intake Air Filters.

This was the initial installation of automatic filters for air-intake cleaning. Only time would prove the wisdom of the customer's choice—the soundness of the manufacturer's design.

The answer has been supplied frequently over the past 23 years by this user's repeat purchases. Pictured above are two of their most recent installations at Hickox and Greenburg, Kansas. Here a total of 20 Multi-Duty Type CMS Filters are serving a like number of 1600 H. P. Cooper Bessemer gas booster engines.

The Multi-Duty has repeated this success story with scores of prominent users. The reason—continuous automatic cleaning of the filter curtain assures both constant efficiency and uniform air delivery regardless of dust load. And you get this dependable protection with a minimum of maintenance—just periodic inspection and regular sludge removal (without shutdown). For outdoor service filters are equipped with protective weather louvers and a plenum chamber for attachment to intake.

Write for Bulletin No. 130. See for yourself how the Multi-Duty makes efficient dust protection a low-cost, trouble-free, round-the-clock operation.

AAF **American Air Filter**
COMPANY, INC.

445 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

CITIES SERVICE OILS WORK ON

"The Longest, Toughest Truck Haul in the World!"

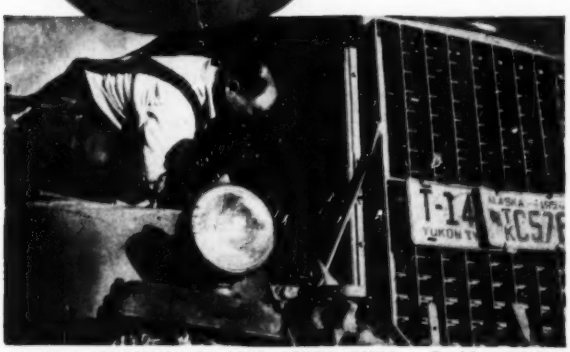
FROM DULUTH, MINN. TO FAIRBANKS, ALASKA . . . 7000 MILES ROUND TRIP PER MONTH . . . IN TEMPERATURES RANGING FROM 100 ABOVE TO 70 BELOW . . .

Albert Herda

...trucker extraordinary, uses Cities Service "C" Series Oil in year round operation.

CITIES SERVICE
Quality Petroleum Products

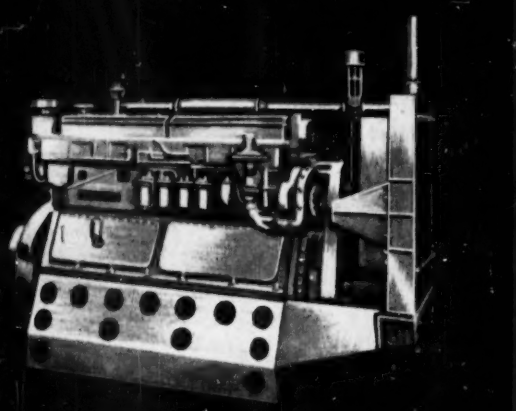
SAYS ALBERT HERDA..."Hauling everything from beer to eggs... across every kind of country...through every kind of weather... I've used Cities Service "C" Series oils and have had the best of luck. I heartily recommend Cities Service Oils for unusually rugged service as well as the ordinary job."

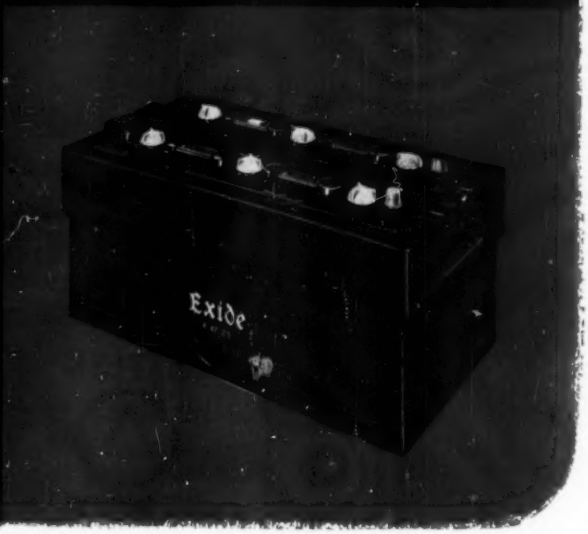


HIS OWN SERVICEMAN ON LONG, LONELY HAULS... Besides driving, Herda handles all the jobs of truck maintenance on the road... everything from changing tires to checking the oil. During the summer when temperatures soar up over a hundred, "C" 300 Series SAE 30 gives him the long motor oil mileage and complete engine protection he must have.

BLOWTORCH HEATS CAB IN ALASKA COLD... Big bus heater not enough to heat cab in extreme cold. Blowtorch aimed at feet does job. Under such tough operating conditions, Herda depends on "C" 300 Series SAE 10 to give complete lubrication and engine protection. High quality Cities Service Products can serve best in your operation too.

EXIDE STARTING POWER





Gets them going...with power to spare

You can always count on Exide Diesel-Starting Batteries. They're built specifically for the job . . . built to meet your most exacting diesel-battery needs. Their mighty starting power is proved daily by tough and rugged laboratory tests that never cease . . . by constant field checking . . . by reports of builders and users of diesel-powered equipment of every kind. In Exide Diesel-Starting Batteries you get:

QUICK BREAKAWAY and fast acceleration of engine to firing speed.

LOW DEPRECIATION due to their extra long life.

RUGGED CONSTRUCTION for rough usage in hard service.

LOW COSTS of operation and maintenance.

Use Exide Diesel-Starting Batteries for all heavy-duty services—in buses, trucks, tractors, off-the-highway equipment, ships, power plants, diesel-electric locomotives.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto

1888 . . . DEPENDABLE BATTERIES FOR 64 YEARS . . . 1952

WHEN IT'S AN Exide YOUR DIESELS START

"Exide" Reg. Trade-mark U.S. Pat. Off.

PETTER

DIESEL ENGINES

AIR-COOLED · WATER-COOLED

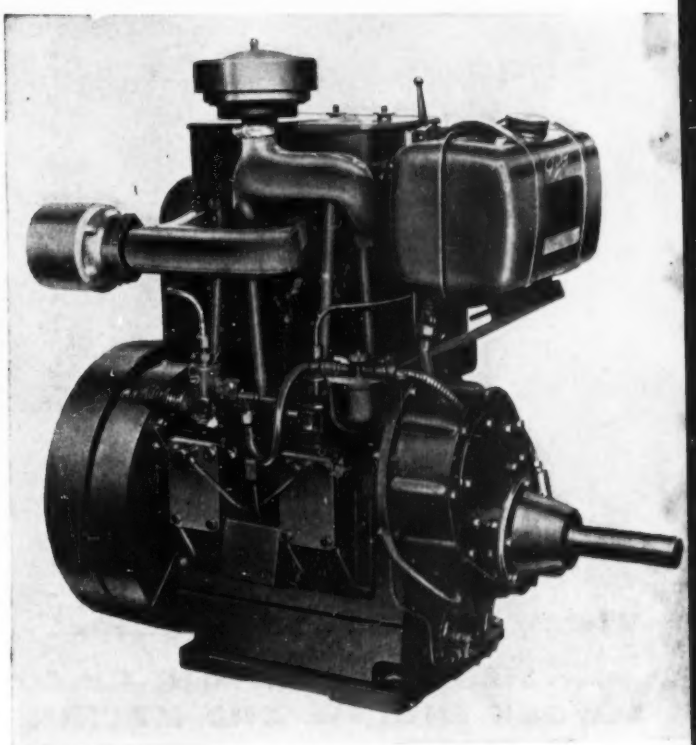
From

3 H.P. TO 40 H.P.

LOW COST

POWER UNITS FOR

- *MARINE AUXILIARIES*
- *GENERATORS*
- *PUMPING EQUIPMENT*
- *COMPRESSORS*
- *REFRIGERATION*
- *OIL FIELD EQUIPMENT*
- *MINING EQUIPMENT*
- *AGRICULTURE MACHINERY*



PETTER RUGGED POWER UNITS

Give you:
Reliability, Low Maintenance Costs
and Low Operating Cost—
only 8/10 Cent/HP/Hour.

Spare Parts & Service Available
World-Wide for more than
300,000 Petter Diesels now in use
—prompt deliveries.

Write for information, still few choice Distributorships Open.

PETTER

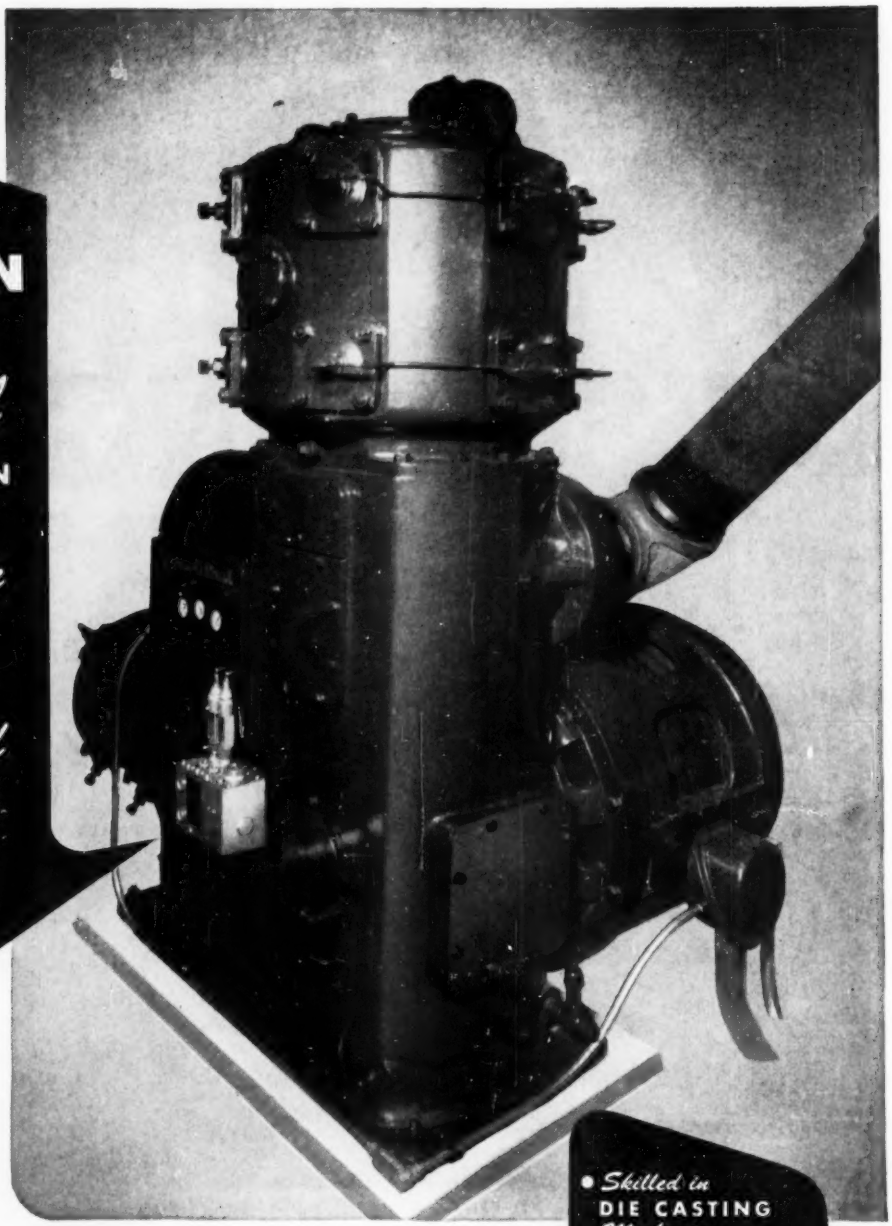
Inquire at your local Petter Distributor or Dealer.

ENGINE DIVISION OF BRUSH ABOE INC.

EMPIRE STATE BUILDING
350 5TH AVE. • NEW YORK 1 • N•Y

MADISON -KIPP *fresh oil* LUBRICATION

fed under pressure by the measured drop!



Illustrated, the Madison-Kipp Model SVH Lubricator on an Ingersoll-Rand XLE Compressor.

- *Skilled in* DIE CASTING *Mechanics*
- *Originators of Really High Speed* AIR TOOLS
- *Experienced in* LUBRICATION *Engineering*

....STANDARD EQUIPMENT ON COMPRESSORS, WORK ENGINES AND MACHINE TOOLS....

Oil under pressure fed drop by drop from a Madison-Kipp Lubricator will definitely increase the production potential for years to come when applied as original equipment on new machine tools, work engines and compressors. There are six popular models for every application. Write for special engineering data for your particular requirement.

MADISON-KIPP CORPORATION

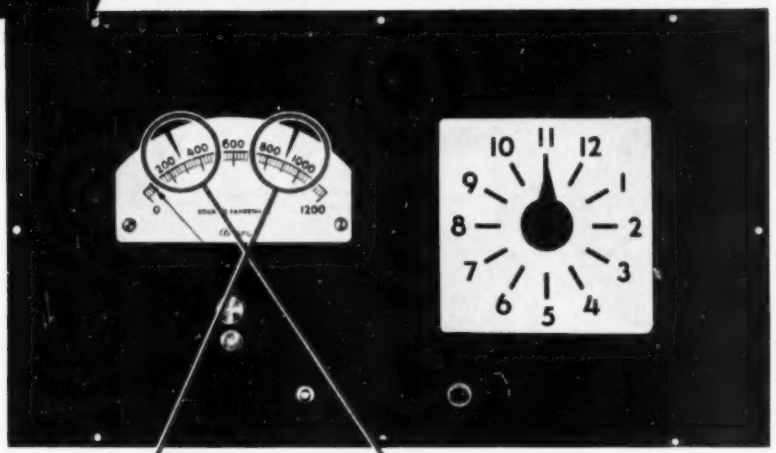
205 WAUBESA STREET, MADISON 10, WIS., U.S.A.

ANCIENS ATELIERS GASQUY, 31 Rue du Marais, Brussels, Belgium, sole agents for Belgium, Holland, France, and Switzerland.

WM. COULTHARD & CO. Ltd., Carlisle, England, sole agents for England, most European countries, India, Australia, and New Zealand.

Alnor

PYROTAC AUTOMATIC PROTECTION



AGAINST *high* AND *low* EXHAUST TEMPERATURES

The surest way to check engine performance is through constant monitoring of exhaust temperatures. Alnor—pioneer in Diesel Pyrometry—now brings you the latest development in the field of Diesel instrumentation. It is the Type 4490 Pyrotac that provides automatic protection against damage due to *both* high and low exhaust temperatures.

The Pyrotac automatically reads every cylinder temperature in the engine every few seconds. When one temperature varies from the rest, the Pyrotac tells you which cylinder—and how much.

If temperatures continue to rise—or fall below pre-set standards, the Pyrotac will automatically sound an alarm, or shut down the engine—and the switch pointer will stop at position of offending cylinder.

Small or large, your Diesel demands the protection of an Alnor Exhaust Pyrometer . . . a proved way to lower cost performance uninterrupted by "foreseeable" breakdowns. Write today for Pyrotac Bulletin 4361 and see how an Alnor engineered and equipped pyrometer installation will fill your needs.

Man knows only that which he can measure

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

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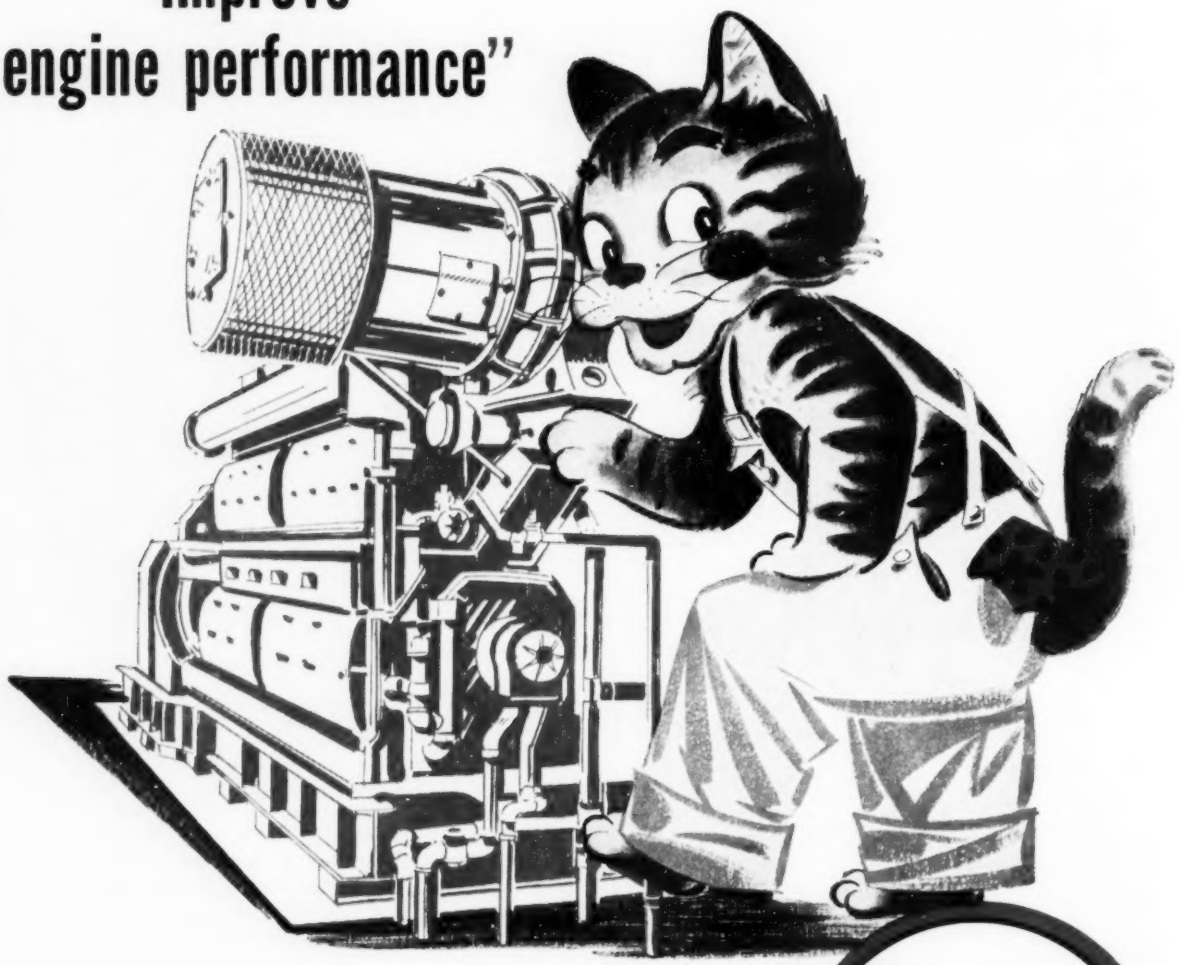
"Tycol Diesel Oils assure free rings improve engine performance"



Certainly! Tycol Diesel Lubricants resist sludging, gumming and carbonization. They are made from specially refined, high quality bases, and offer outstanding stability. They have high resistance to heat and decomposition. They help diesels operate continuously . . . with maximum efficiency . . . and lowest maintenance costs.

There is a Tycol Diesel Oil scientifically engineered for every Diesel application – from high-speed units for industrial, railway and marine uses where a heavy-duty or detergent oil is necessary to low speed Diesels where a non-additive lubricant can be used.

Want to learn more about these fine oils – engineered to do the job better, at lower cost? Call or write your nearest Tide Water Associated office today.

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TIDE WATER ASSOCIATED OIL COMPANY

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Eaton Parts for Diesel Engines

have a background of years of cooperation with the Diesel industry

Eaton is proud to have served as supplier to leading Diesel engine manufacturers for many years—furnishing valves, free-valves, lash adjusters, valve seat inserts, cam followers, bolts, studs, and other precision parts. This close cooperation with the Diesel industry has given Eaton engineers a thorough understanding of the requirements of specific engines, so essential in solving valve-train and other problems.

EATON MANUFACTURING COMPANY

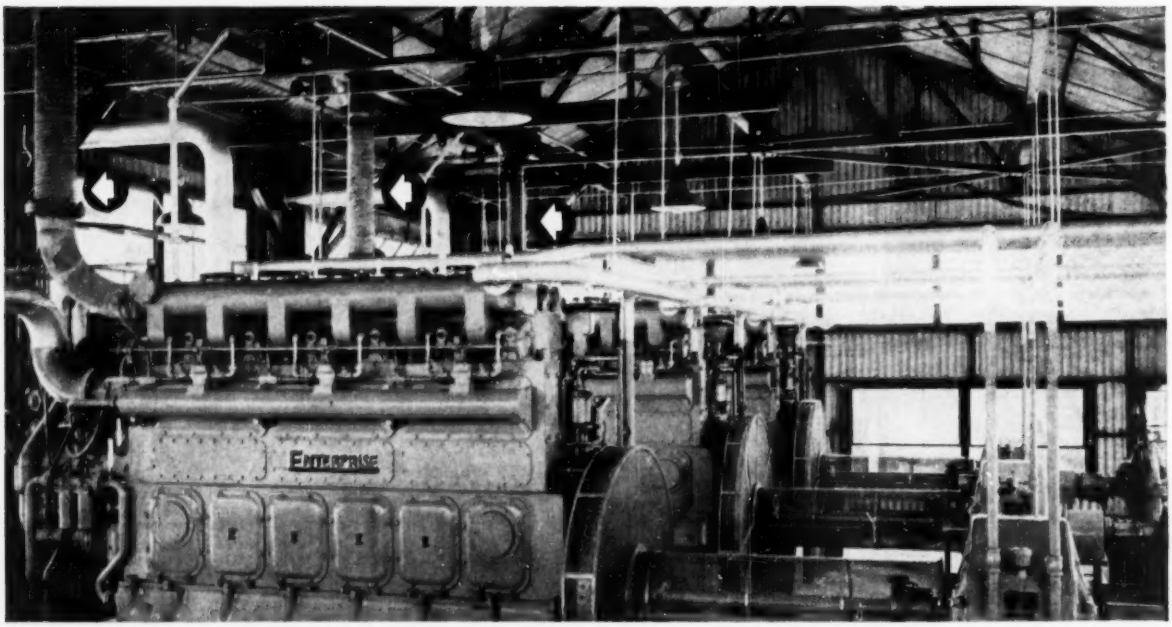
CLEVELAND, OHIO

SAGINAW DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

CUTTING COSTS

OF EXHAUST LINES



HARD WORKING Enterprise Dual Fuel (460 HP) Diesel Engines in Union Oil Marine Pumping Terminal, Avila, California, depend on American Corrugated Steel Hose to absorb stresses set up by vibration and heat.

This American Flexible Steel Hose absorbs vibration, prevents line breaks

Cost of exhaust lines is more than a matter of initial price. It is measured also in ease of installation and in service.

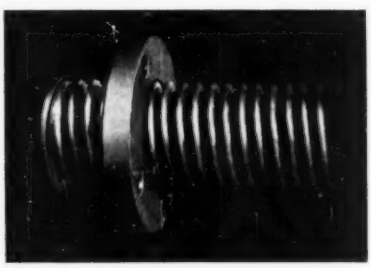
You don't get ease of installation when you must laboriously match connections with rigid pipe. You don't get service when you must frequently replace flexible lines that fatigue prematurely, fastenings that shear and snap, and rigid lines that crack from engine heat and pulsation.

The cost of exhaust lines is worth the price only when they are *flexible* and *tough enough* to take vibration, pulsation, and extreme temperature variations for long periods. Such basic toughness is built into American Flexible Steel Exhaust and Air Intake Hose. Throughout thousands of hours of rugged engine operation, it will give uninterrupted service.

In addition to exhaust and air intake lines, there's a whole family of ready-to-use American Flexible Metal Connectors to help solve potentially troublesome piping problems: starting air, circulating water, fuel oil, lubricating oil, etc.—both on marine and stationary diesel engines. It will pay you to ask us for complete literature.

For original equipment or for replacement, specify American Flexible Corrugated Steel Hose. The American Brass Company, American Metal Hose Branch, Waterbury 20, Connecticut. In Canada: The Canadian Fairbanks-Morse Company, Limited.

52269



AMERICAN Corrugated Steel Exhaust Hose is available in sizes through 16" I.D. Flanges to ASA standards or Navy specifications can be supplied.

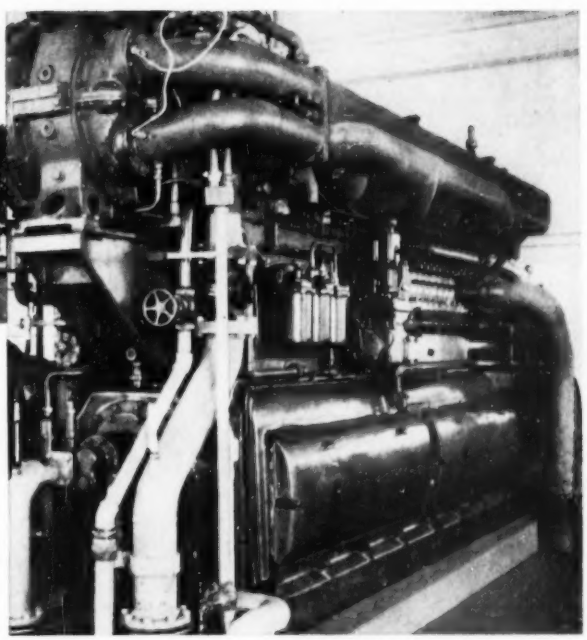
NEW, INFORMATIVE BOOKLET EH-50 ready soon. Write for copy. Includes data on dimensions, bending diameters, weights, pressures, etc.; also information on fittings, flanges.

wherever connectors must move . . .

American ANACONDA **FLEXIBLE METAL HOSE AND TUBING**

165,000 hours of service completed by 28 Alco Diesels at 98½% availability

for Gulf Refining Company



Twenty-two years ago, Gulf Refining Company installed 28 Alco Diesel Engines on its new, 700-mile Tulsa-to-Spencerville Junction pipeline. Today, those 28 Alco Diesels have completed more than 165,000 hours of service and are operating at 98½% availability. And since 1941, when the output of the line was greatly increased, they have been in actual service an average of 97% of the time.

Pumping station superintendents throughout the United States and Canada specify Alco Standardized Diesels because of this kind of *proved* dependability——and because of these economy features:

- **Compactness**—for lower construction costs
- **Higher Engine Efficiency**—for lower fuel costs
- **Medium Speed**—for lower auxiliary equipment costs
- **Flexible Power Range**—for lower expansion costs

For the complete story on Alco Diesel Engines, contact your nearest American Locomotive Company Sales Office. You will find them in New York, Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady and St. Louis.

ALCO DIESELS

THE MARK OF MODERN ENGINEERING

AMERICAN LOCOMOTIVE COMPANY

Americans Are Rolling Up Their Sleeves!

YES, ALL KINDS OF PEOPLE ARE GIVING BLOOD SO THAT OUR WOUNDED MAY LIVE!

● Today, the blood of a Boston bookkeeper may be flowing through the veins of a wounded kid from a Kansas farm . . . the blood of a pretty Southern housewife may have saved the life of a grizzled leatherneck. For, blood is blood, a God-given miracle for which there is no substitute . . . and when a man's life hangs in the balance and blood is needed, there is nothing else to take its place!

Right now the need for blood is urgent. In hospitals —at home and overseas— many men require four and six transfusions during delicate operations. And the blood *must be there*—when it's needed. So give the most precious gift of all—*your* blood!

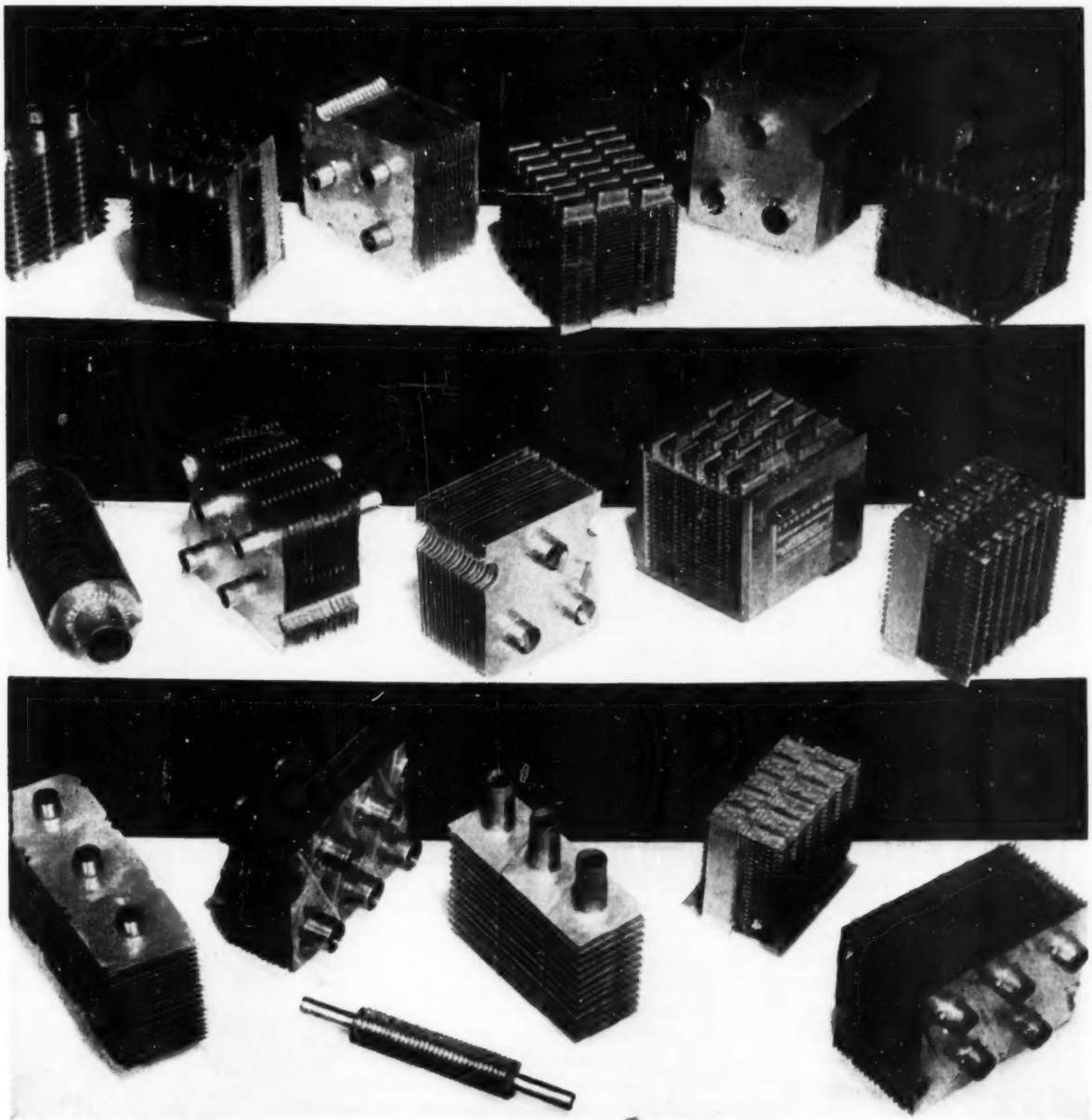
Be assured that giving blood is neither difficult nor distressing. And what a thrill there is in knowing that you've performed a really unselfish act! So call your local American Red Cross today and make an appointment. And tell your friends and neighbors about your experience. Let them share the wonderful feeling Americans get when they roll up their sleeves—and give blood.

But—

WHAT HAPPENED TO THAT PINT OF BLOOD YOU WERE GOING TO GIVE?

Call Your American Red Cross Today!

Young Makes Cores By The Scores!



No matter how specialized your engine cooling needs, Young Engineers are able to design cores to meet your requirements. Shown above are 17 core models . . . only a few of the many types doing yoeman service in thousands of installations. Pictured are round tubes with and without internal agitators, flat tubes, plate fins, spiral fins, with metallic or mechanical bond of tubes and fins for perfect, permanent bond and maximum heat transfer. Young makes cores by the scores in a variety of metals. Call on Young Engineers to solve your cooling problems.

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Heat Transfer Products for Automotive and Industrial Applications.

Heating, Cooling, Air Conditioning Products for Home and Industry.

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Factories at Racine, Wisconsin and Mattoon, Illinois

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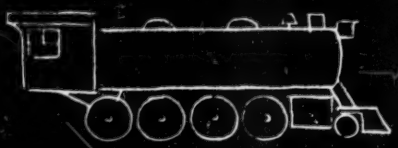
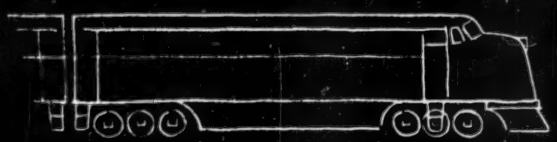
LOS ANGELES: Flournoy & Everett, Inc., 5043 Santa Fe Ave. Other Representatives in Principal Cities

AMERICA WINS THIS SCRAP!



the average steam locomotive
displaced by a General Motors Diesel



provides enough scrap metal to meet
steel production requirements for one
Diesel locomotive unit

plus — TEN 40-TON TANKS

And when railroads are completely dieselized, America will save millions of gallons of fuel oil and millions of tons of coal per year—because GM Diesel locomotives do more work on less fuel!

To conserve steel / and Fuel — America needs more Diesels!

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS

LA GRANGE, ILLINOIS—*In Canada:* GENERAL MOTORS DIESEL, LTD., LONDON, ONTARIO

If you are interested in the conservation of fuel and metals by Diesel locomotives, write Electro-Motive Division for a recent study.

THE EXPERIENCE OF A PIONEER CANNOT BE ACQUIRED OVERNIGHT

The men who led the westward movement of our people across America's plains and mountains had to learn many of their lessons from one unfailing teacher. That teacher, then and to this day, is Experience. There is no substitute for it. You cannot enjoy its benefits by reading about it, nor merely by copying the actions of others or voicing, parrot-like, their well-learned principles. This is as true in learning how to protect fuels, lubricants and machinery from dirt as it was in learning how to protect those pioneering settlers from hunger, thirst or the attacks of savages. So we say: *The makers of Winslow Filters and Elements have been pioneering the principle and successful application of Full-Flow filtration for nearly twenty years.* We take pride in original patents which we hold, and we congratulate those other manufacturers who are finally beginning to endorse the same ideas. But to those of you who are buying *full-flow filters*, we repeat: The experience of a pioneer cannot be acquired overnight. For added value born of experience, specify Winslow Filters!

FOR EVEN GREATER SAFETY, REMEMBER THE WINSLOW WARRANTY. ASK ABOUT ITS PROTECTION OF *YOUR* COSTLY EQUIPMENT!

WINSLOW FILTERS

Winslow Engineering Company 4069 Hollis Street, Oakland 8, California

"Every dollar --double duty..."

HARVEY S. FIRESTONE, JR.
Chairman, The Firestone Tire and Rubber Company

"Every dollar invested in U.S. Defense Bonds does double duty. Through the Payroll Savings Plan we help in the building of national defense and, at the same time, provide for personal security in the years to come. The Firestone organization is proud that more than 29,000 of our employees are participating in the Payroll Savings Plan."

Do America's wage earners appreciate that double duty feature of Defense Bonds? Let's take a quick look at a few figures:

- 7,500,000 employed men and women are investing *one hundred and fifty million dollars per month* in Defense Bonds through the Payroll Savings Plan.
- The number of Payroll Savers is going up steadily.
- In the first six months of this year, sales of Series E $25 and $50 Bonds—the payroll savers' sizes—totaled 33,946,000 pieces—an increase of 22% over the corresponding period of 1951.
- Sales of E Bonds in January-June, 1952 totaled $1,715 million—5% more than in the same period of 1951. (The Payroll Savings Plan is the backbone of E Bond sales.)
- Today Americans hold a cash value of more than $49 billion in Savings Bonds. Their holdings of E Bonds—the Series bought by Payroll Savers—are now $35 billion—$5 billion greater than at the end of the war.

What are *you* doing to help *your* employees build for national defense and personal security?

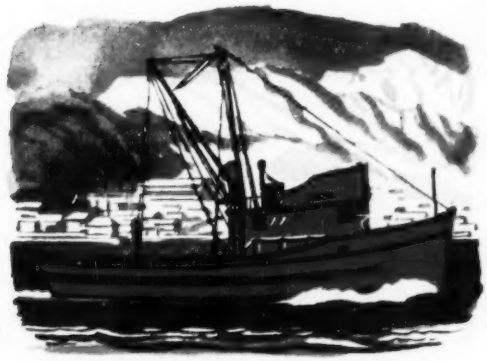
If you have a Payroll Savings Plan, and participation is less than 50%, conduct a person-to-person canvass of employees of your plants and offices. Make sure that a Payroll Application Blank is placed in the hands of every employee. He or she will do the rest. Participation in your Plan will jump to 60%, 70%—even higher, as it has in hundreds and hundreds of plants that have conducted similar canvasses.

If you do not have the Payroll Savings Plan, phone, wire or write to Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D. C. Your State Director will help you to install the Plan—or to conduct a person-to-person canvass.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

Men who depend on power...know they can depend on CUMMINS®

Every CUMMINS DIESEL is built not once but twice



Whatever the power application—whether it's in the marine field or mining, trucking or construction, drilling or handling dozens of other important tasks—you're sure of a consistently reliable performance with a Cummins Diesel on the job.

Every Cummins Diesel is actually built *twice!* After initial assembly and run-in testing, every engine is disassembled, inspected; then reassembled and tested again.

This extra care—together with Cummins' exclusive fuel system and efficient parts and service organization—makes lightweight, high-speed (50-550 h.p.) Cummins Diesels a wise first choice *for men who depend on power.* See your Cummins dealer.

CUMMINS ENGINE COMPANY, INC., Columbus, Ind.

Export: Cummins Diesel Export Corporation
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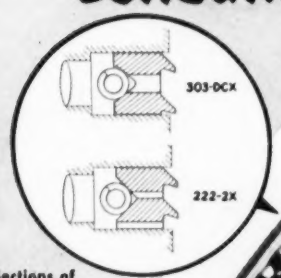
Leaders in lightweight, high-speed diesel power!

CUMMINS Diesel DIESEL

® TRADEMARK REG. U.S. PAT. OFF.

Why COOK "SUPER-FLEX" OIL CONTROL RINGS *reduce lube-oil consumption*



Sections of two typical rings.

Coil peripherial compression type expander, contained by the ring, simplifies application—fits existing grooves.

Straight-line oil flow, unrestricted by expander, assures maximum drainage.

Flexible ring section assures cylinder contact at all points—provides uniform and positive wiping action.

Tension is adjustable by inserting washers here.

Spring wire of rectangular cross-section gives expander stability—reduces localized stresses—assures uniform tension.

Ring and Expander Spring "float" in groove—cylinder contact is undisturbed by piston "slap".

Expander never touches groove lands or bottom—preventing damage to groove and expander.

COOK "SUPER-FLEX" OIL CONTROL RINGS

meet the crying demand for a more flexible ring that will conform to cylinder distortion and at the same time provide uniform wiping action all the way around the cylinder. Available in many styles to meet varying piston conditions, these advanced design oil rings reduce lube-oil consumption and maintain their efficacy throughout ring life. Write for recommendations job-engineered to your particular engine requirements. C. Lee Cook Mfg. Co., Incorporated, Louisville 3, Ky. Representatives in principal industrial cities.

COOK
PISTON RINGS

. . . SEALING PRESSURES SINCE 1888 . . .

DIESEL POWER
AND DIESEL TRANSPORTATION

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December, 1952

Vol. 30, No. 12

Season's Greetings

Cover Photo: This giant aerial tramway has been constructed on Alcan's British Columbia project to lift men and equipment to the tunnel headings being constructed half a mile above the valley floor. The 9-ton car can lift 60 men or 20 tons of equipment.

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"Ring and Cylinder Wear... Way Below Average"

Says Supt. R. Carlson,
City of Saint Louis, Michigan

"Much of our Success is due to SINCLAIR GASCON OIL D"

The City of Saint Louis, Michigan, depends on diesels to furnish electric light and power... And Mr. Russel Carlson, Supt. of the Saint Louis power plant, depends on Sinclair GASCON OIL D to keep his large Nordberg and three large Fairbanks-Morse diesel engines humming 24 hours a day—with an absolute minimum of downtime.

Says Mr. Carlson, "Experience has shown that our best results are obtained with Sinclair GASCON OIL D. Our engine cylinders and piston rings show minimum wear—in fact, *way below average*. We attribute much of our success to GASCON®."

Let Sinclair help reduce your engine wear. Contact your nearest Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR DIESEL LUBRICANTS
save wear and replacement

Editorially Speaking....

Dirty Pool

One of these days the perennial argument of public versus private power will be settled. That will probably be 'round about the time that we get power from cosmic rays or nuclear fission or fusion—take your pick. But right now we have to live with more mundane forms of power and agencies of distribution.

An immediate solution that occurs to us can best be described by borrowing a term from world politics — "self-determination". It simply means that a body of people should have the right to choose for themselves — in this case, to pick the source of power that they want.

Now, one more piece of editorializing and we get to the point. One of our heritages is the principle of free enterprise. But through the years, certain rules have been worked out. Public opinion and good business ethics limit how far anyone can — or at least, should — go.

Now, let's see what is happening in Sebewaing, a relatively small community in northern Michigan that has been served exclusively by its own municipal power plant for over 40 years. Sebewaing, like everyone else, needs more power and after competitive bidding, entered into a contract for a diesel generator. The Defense Electric Power Administration approved. Simple enough—but wait!

Detroit Edison, privately-owned utility serving adjacent areas, apparently feels that they should get *all* the business in the area although Sebewaing has not been competitive in any sense. How do they go about getting it?

Failing in efforts to get the citizenry in mass meetings to listen to their arguments, they have resorted to advertisements in the local press attacking the Council, both generally and with respect to their decision to buy a new engine. The ads are full of misstatements and half-statements showing a lack of full information on the plant's excellent operating record. The purpose, of course, is to undermine the people's faith in their elected officials so that they will abandon their own plant and purchase power from Detroit Edison.

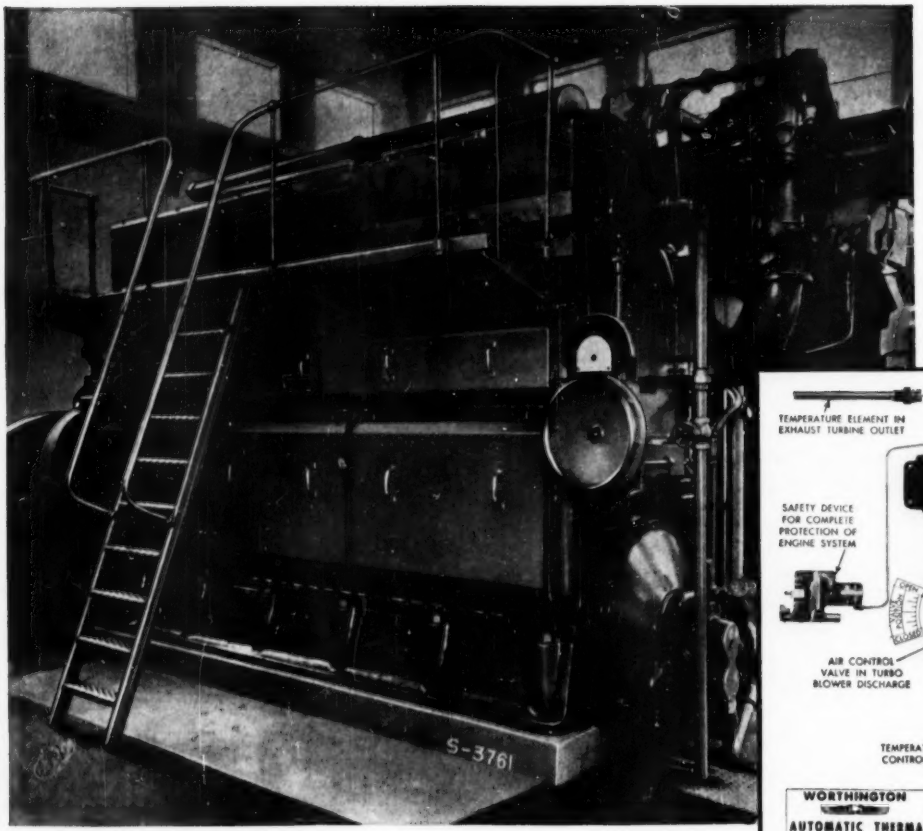
Village officials have met with those of Detroit Edison in efforts to get them to refrain from this type of punitive advertising. No success. Detroit Edison has purchased a sub-station site adjacent to the village limits and has worked night and day to build approximately seven miles of apparently unneeded transmission line connecting it to their system. All this, although the Council has not agreed to purchase any power.

An injunction was filed to stop the purchase of the engine. In subsequent hearings, decision was rendered that the legal basis for the injunction, while it might apply to a new municipal plant, did not apply in the case of an addition to an existing plant of long standing. The injunction was dissolved.

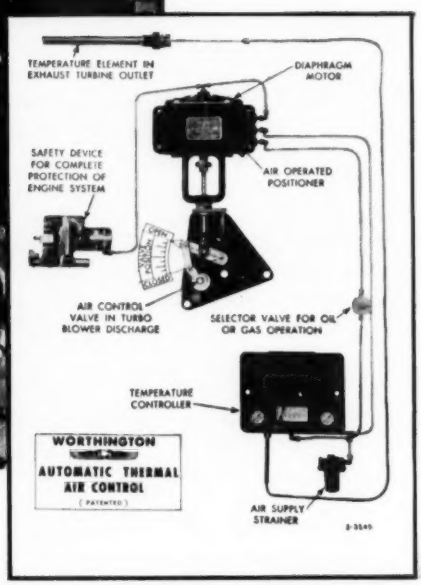
It looks as if Sebewaing will get their engine, thanks to the efforts of the village officials and the cooperation of the Michigan Municipal Utilities Association. But why should these people be subjected to such a rigmarole? Such hassels are unpleasant and leave strained relations after they are settled. These are the least of the objectionable aspects.

Most important is the apparent willingness of a private firm to flaunt the will of the people to serve their own selfish ends. This is the sort of thing that is supposed to have disappeared along with the "robber barons", early in this century, under the weight of enlightened public opinion.

Here are really "reactionary" practices. We call it "dirty pool".



HANDLING INCREASING LOADS at the Vermillion, S. D., municipal power plant is this Worthington converted 840-kw dual fuel Diesel engine.


TEMPERATURE ELEMENT IN EXHAUST TURBINE OUTLET
DIAPHRAGM MOTOR
SAFETY DEVICE FOR COMPLETE PROTECTION OF ENGINE SYSTEM
AIR OPERATED POSITIONER
AIR CONTROL VALVE IN TURBO BLOWER DISCHARGE
SELECTOR VALVE FOR OIL OR GAS OPERATION
TEMPERATURE CONTROLLER
WORTHINGTON
AUTOMATIC THERMAL AIR CONTROL
(PATENTED)
AIR SUPPLY STRAINER

WORTHINGTON AUTOMATIC THERMAL AIR CONTROL supplies correct air-fuel ratio to the engine cylinders *at all times* and *in direct relation to all load changes.*

Vermillion, South Dakota, meets new power demands

In 1949, the City of Vermillion, South Dakota, was faced with the necessity of meeting increased electrical load requirements on its municipal power plant.

To solve this problem, Vermillion plant engineers decided to have their Worthington EE-6 Diesel engine, installed in 1937, converted to a more powerful unit.

Worthington engineered the change-over of the 500-kw naturally aspirated oil Diesel to an 840-kw supercharged dual fuel Diesel—an increase of 340 kw. Engine speed was raised from 327 to 360 rpm.

Now, after a year and a half of heavy-duty operation, the Worthington converted engine has proved to be the most efficient and reliable power producer in the Vermillion plant.

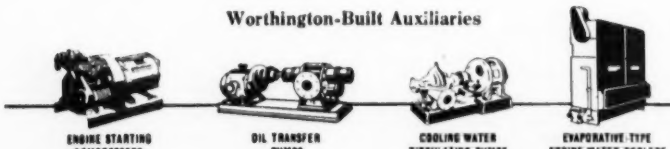
Four of the many exclusive Worthington features that insure top performance of Worthington dual fuel engines are:

1. Worthington automatic thermal air control for improved fuel economy.
2. Worthington dual plunger fuel pump for better, quieter combustion.
3. Worthington micro-metering gas valves—one for each cylinder—for equal cylinder loading and better speed regulation.
4. Worthington helical steel gear train for accurate and positive control of engine timing.

Worthington Corporation, Engine Division, Buffalo, New York.

E.2.5

Worthington-Built Auxiliaries



Economical Continuous Power—Diesels, Oil and Dual Fuel, and Spark-Ignition Gas Engines, from 150 to 2100 bhp.

WORTHINGTON
Engines

+ HIGHLIGHTS +

● Approximately 31,000 tons of ferrous scrap have been recovered by a Navy project just recently completed in the Aleutian Islands area.

● From the Ethyl Corp., we hear that experimental fuels costing over $1300 a gal are now being studied in an effort to provide the nation's motorists with gasoline of still greater efficiency.

● From January to October 1952, Class I railroads installed 2667 power units or 2096 new locomotives in service, of which 2080 were diesel, consisting of 2650 power units.

● According to H. G. Dyktor, Commissioner of Air Pollution for Cleveland, over $700 million has been spent in recent years to cut down smoke and grime. He predicts an additional $100 million will be spent by U. S. industries this year in the same way.

● A new post-war record has been set in the production of primary aluminum. In August 170,350,658 lb were produced—a gain of 12.5 per cent over the previous month. This is the largest output since December 1943.

● The possible discovery of a uranium lode in the eastern part of the Seward Peninsula, Alaska, is indicated in a recent report of the Geological Survey.

● In a recent release, the General Motors Corporation announced October truck production for 1952 was 52,861 as compared with 40,253 for the same month of 1951.

● According to Charles F. Kittering, a director for the General Motors Corp., a crop grown on an acre of ground will furnish enough fuel to run a car for three years. The specific crop was not mentioned, but it was disclosed that experimentation is underway.

● As of November 1, Class I roads had 845 new diesel locomotives on order.

● During the first nine months of 1952, world consumption of natural rubber decreased 6.3 per cent as compared with the same period of the preceding year.

● A recent NPA release stated that world production of rubber for the first eight months totaled 1,157,500 tons—nine per cent below last year's production for the same period.

● SDPA has recently granted a $400,000 loan to the Davenport-Besler Corporation, manufacturers of diesel, diesel-electric, and steam locomotives.

● Transport Vehicle Show, Inc., will sponsor the 1953 National Transport Vehicle Show and Fleet Maintenance Exposition in New York City. The show will be held at the West 62nd Street Armory located on Columbus Avenue.

● GM announced recently that springs have been replaced with air on their new model PD-4104 coach. The new coaches ride on rubberized nylon bellows filled with compressed air.

● A release from the Budd Company announces an order from the Baltimore and Ohio Railroad for three more diesel rail cars.

● A diesel engine blower test stand, making it possible to simulate shipboard conditions is now in use at the Charleston Naval Shipyard. Details are available on request from Navy Technical News, Office of Information, Navy Department, Washington 25, D. C.

● As of November 1, 1952, there were 90,708 freight cars on order and undelivered according to the Association of American Railroads.

● From the British Information Service we hear that the British Industries Fair is scheduled for London and Birmingham, England, from April 27 to May 8, 1953.

● According to M. W. Cresap, Jr., V. P. of Westinghouse Electric Corp., flexible long-term planning is the key to business success—write your plans in pencil, not ink.

● Since World War II, motor vehicle registration has increased by over 3.7 million per year. However, we are still building roads at a pre-war rate.

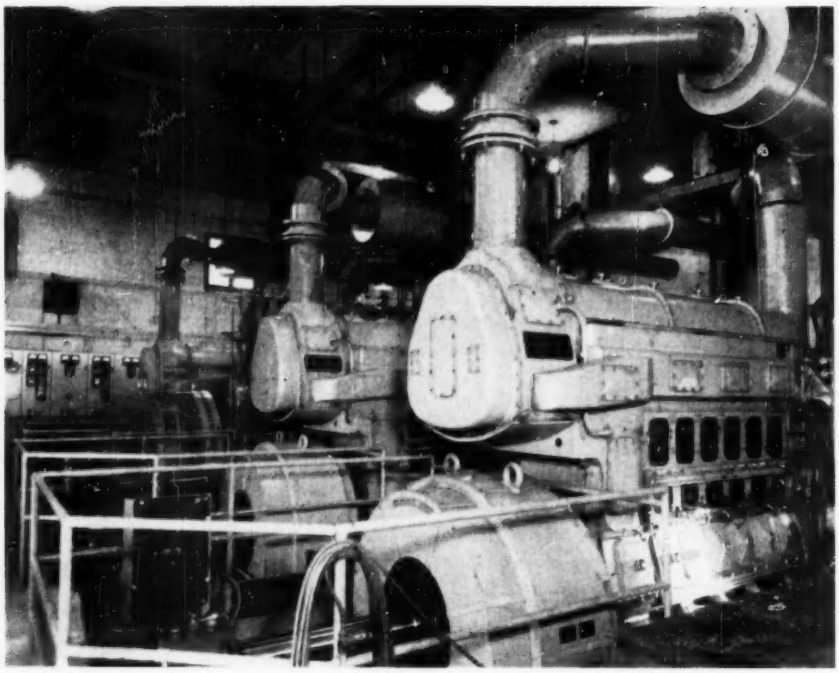
● The National Board of Fire Underwriters warns us of the hazards connected with Christmas trees—be careful, *Keep Christmas Merry*, is their advice. The pamphlet is available, free of charge, by writing them at 85 John Street, New York 38, N. Y.

● In the first eight months of this year losses due to fire were up 5.6 per cent. Approximately one every 36 seconds.

● The Machine Tool industry is at the present time producing at the rate of $100,000,000 per month. At this rate of production, backlog has been put between 11 and 12 months.

● A recent release from the API tells us that consumption of natural gas has increased more than five times in the last 25 years, and oil consumption three times.

● Recently, the Automobile Manufacturers Association stated that "a survey of stockyards showed that 75 per cent of all livestock comes to market by truck . . ." Along with this, 47.7 per cent of all fruit and vegetables and 99.7 per cent of all live poultry travels by truck to market.—How much of this travels by diesel-powered equipment?



More than 14,000,000 kwhr have been generated by the three F-M diesels which are the principal prime movers in this REA plant.

New Mexico Co-op Serves Rugged Area

Where transmission lines must go thousands of feet up the side of a mountain and through dense forests, where no utility would think of stringing power lines, the Kit Carson Co-op supplies electrical power to its 3747 members.

FABULOUS country surrounds the Kit Carson Electric Cooperative power plant at Taos, New Mexico. Just two miles to the North is Taos Pueblo, oldest continuously inhabited dwellings known to man. And every morning, a group of Taos citizens drive 60 mi southwest to work at Los Alamos, center of atomic energy research.

In the area served by this plant, lies Carson National Forest, a million acres of rugged vacationland and towering peaks like the 13,151-ft Wheeler Peak, highest in New Mexico. This is indeed a land of contrasts, with a famous Spanish mission, the home and burial grounds of legendary Kit Carson, Ponce de Leon hot springs and Ojo Caliente mineral springs, fishing at Red River, ski runs at Tres Ritos, and a world-famous art colony at Taos.

These contrasts extend to the power system and its operation. In part of the area, line construction and repair is handled with the most modern of equipment, the last word in line trucks with two-way radio and all the trimmings. In other parts of the region served, no sane contractor would bid on a construction job, and the Cooperative's crews work on foot with horses to pull the wire. This is territory where transmission lines must go through dense forest and thousands of feet up a steep mountainside, where outages sometimes occur because an industrious beaver has dropped a log across the line.

This is hardly the kind of terrain that attracts public utility companies, and most of the region was without electricity until the recent past. When Kit Carson Electric Cooperative was formed in 1944, and purchased the facilities of the local utility company, there were just 67 mi of line serving 1100 customers in Taos and adjacent villages. By the end of 1951, the Cooperative had energized more than 662 mi of line, serving 3747 members. The area served, has a population of 24,000 and includes all of Taos County and parts of Colfax and Rio Arriba Counties, with some line extending into southern Colorado.

Demand for electric power has grown steadily. Residential and resort areas, of course, need electricity, but this is more than a gigantic vacation-land. This is sheep country with numerous ranches. This is agricultural

YEAR	Kwhr Generated		Gal Fuel		Kwhr Per Gal Fuel		Engine Hours	
	OP'S	PLANT	OP'S	PLANT	OP'S	PLANT	OP'S	PLANT
10 mo/1951	4,363,000	4,679,300	318,373	344,099	13.70	13.59	10,241	12,153
1950	4,671,700	4,986,200	354,952	381,429	13.16	13.07	11,307	13,265
1949	3,828,990	4,023,640	308,062	326,026	12.42	12.34	10,226	11,673
1948	1,401,050	2,656,580	112,529	236,865	12.45	11.21	3,529	13,507
Totals	14,264,740	16,345,740	1,093,916	1,288,419	13.04	12.76	35,303	50,598

country with long narrow wheat and feed farms stretching back from the precious waters of the Rio Grande. This is timber country with many saw mills. Finally, this is mining country with a molybdenum mine, a pearlite mine, and one of the richest mica-producing mines in the Rockies. Peak loads have topped 1530 kw, and industrial users are negotiating for an additional 1500 kw.

The original generating facilities taken over from the utility consisted of a Worthington and two De La Vergne diesels, rated respectively at 150 kw, 125 kw, and 215 kw, at Taos' 6983-ft elevation. In December 1946, a used Cooper-Bessemer diesel derated at 236 kw was installed.

Major expansion came in 1948 and 1949 when the two smallest engines were removed to make room for three new Fairbanks-Morse opposed-piston diesels. These 6-cyl engines, with 8⅛-in bore and 10-in stroke, have a sea level rating of 960 hp at 720 rpm. At the Taos altitude, each unit turns an F-M alternator with output of 522 kw. The first of these heavy-duty diesels went into service on June 12, 1948, the second on December 8, 1948, and the third on January 15, 1949. By the end of October 1951, the three OP's had run a combined total of 35,303 engine hours and had produced 14,264,740 kwhr.

Operating a power plant up in the mountains of New Mexico poses some cost problems. There are no railroads in Taos County and fuel oil is brought in by truck at a delivered price of 11.5 cents a gal. There are four storage tanks, three 6000-gal, and one 3000-gal. Two of the larger tanks are equipped with heating coils so that engine jacket water can be circulated to warm the fuel in winter. With the 38 gravity fuel now in use, there is no need to heat the oil. Motor-driven transfer pumps move the fuel from the underground steel storage tanks to elevated day tanks from which it flows by gravity to the engines. Fuel is filtered and metered twice, before entering storage and just before it reaches the engines.

With fuel oil at 11.5 cents, efficiency in fuel consumption becomes specially important. The opposed-piston diesels have consumed a total of 1,093,916 gal of oil in generating 14,264,740 kwhr, an average of 13.04 kwhr per gal. Actually, efficiency has improved markedly from year to year, reaching an average of 13.7 kwhr per gal in the first 10 months of 1951. During this period, the No. 1 OP, working at an average load of 78 per cent, produced 1,476,100 kwhr on 102,794 gal of fuel, an impressive average of 14.36 kwhr per gal.

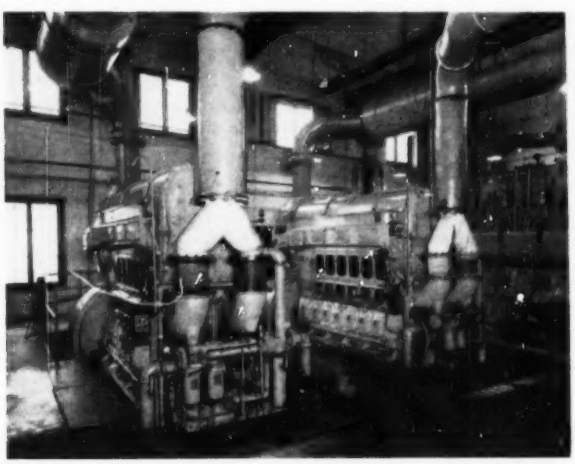
Results of improved efficiency and growing load has been an important reduction in generating cost per kwhr. Only in 1951 did cost inflation outstrip operating improvement. Here are the figures for four years, ending September 30th.

	1948	1949	1950	1951
Total Kwhr	2,526,326	3,868,507	4,781,200	5,480,820
Total Cost	$57,839.40	$69,781.45	$63,663.28	$75,402.07
Cost per Kwhr	$0.02289	$0.01803	$0.01332	$0.01376

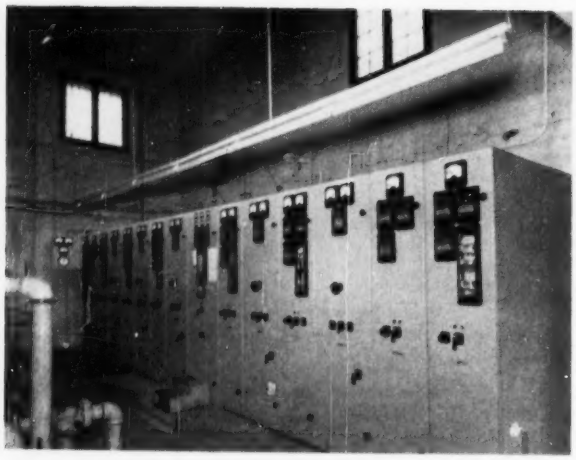
The plant is economical in its use of water, as each engine has an individual closed cooling system. In the case of the OP's, there is a motor-driven 325-gpm centrifugal pump to circulate soft water through the engine jackets and through a pair of radiators. An automatic thermostatic control bypasses water around the radiators to maintain the prescribed temperature. A second pump puts water through a shell-and-tube oil cooler. Radiator fans are driven through reduction gears by 15 hp motors.

Detergent lubricating oils are used in all the engines. In the case of each F-M opposed-piston engine, some lube is bled continuously from the engine's pressure circuit and cleaned in a cellulose-type multi-cartridge filter. Every 1000 hr, the oil is put through a batch purifier with vaporizer and cellulose filtration elements. Each OP has a motor-driven auxiliary lube pump. Lube temperature is controlled by oil coolers with thermostatic bypass valves.

As the plant is close to a residential section, intake and exhaust silencers are a must and help it to be a good neighbor.



For a 10-month period, one of the O-P engines has averaged 14.36 kwhr per gal of fuel. The third O-P is to the right behind one of the older engines.



Above, is the main switchboard with electrically operated switch-gear which serves the entire plant. Below, are the pairs of radiators which are used for cooling the O-P engines. They are housed in a long narrow chamber to the rear of the engine room.

Giant strides have been made by the Cooperative in a few short years, largely because of its experienced and energetic personnel. Gaylord A. Burt, who was manager for the utility company, continued as manager of the Cooperative. Mr. Burt has been prominent in state power circles, serving as president of the New Mexico Association of REA Cooperatives, and working through the Plains Electric Generating Cooperative to improve power supply for 12 New Mexico cooperatives by interconnection of lines and possibly the development of new generating stations.

Other staff members include W. H. Downs, office manager; F. S. Church, coordinator; Virgil Childers, construction superintendent; and R. H. Parker, generating plant chief **engineer.**

The Cooperative is managed by a board of local businessmen with Leo Gonzales of Taos as president, Chris Gallegos of Questa as vice president, G. F. Martinez of Taos as secretary-treasurer. Other trustees are: George Lovato of Penasco, Virgilio Trujillo of Llano, Phillip Mauro of Ojo Caliente, Blas Chavez of Los Cordoves, Bill Cater of Cerro, and Cipriano Mares of Black Lakes.

Principal Equipment

Engines	Fairbanks, Morse & Co.
Lubrication System	
Oil	Texaco Ursa X, Texas Co.
	Cosden Special, Cosden Petroleum Co.
Filter	Fairbanks, Morse & Co.
Purifier	United States Hoffman Machinery Corp.
Auxiliary Pumps	Geo. D. Roper Corp.
Oil Cooler	Ross Heater Div., Kewanee-Ross Corp.
Fuel System	
Oil	Cosden Petroleum Co.
Strainer and Meters	Neptune Meter Co.
Transfer Pumps	Geo. D. Roper Corp.
Filter	Wm. W. Nugent & Co., Inc.
Cooling System	
Radiators	Fairbanks, Morse & Co.
Motors driving Radiator Fans	Fairbanks, Morse & Co.
Reduction Gears for Radiator drive	Falk
Thermostat Controls	Fulton Sylphon Div.
Jacket Water Pump	Fairbanks, Morse & Co.
Air Compressors	Ingersoll-Rand Co.
Switchboard	General Electric Co.
Batteries	Exide
Pyrometers	Alnor, Illinois Testing Laboratories
Intake and Exhaust Silencers	Maxim Silencer Co.
Air Filters	American Air Filter Co., Inc.

What Do You Know!

More questions concerning different phases of the diesel field. Make your selections, then turn to Page 82 for the correct answers.

1. Due to the electrical equipment in diesel locomotive engine rooms, liquid cleaning is not practical.
   a. True b. False

2. The practice of prewetting exterior surfaces when cleaning with acid-type cleaners is used because:
   a. Wetting with such cleaners is difficult
   b. Better distribution over the surface is achieved
   c. Dilution takes place in cracks and crevices

3. Tractive effort of switchers can be increased by the use of a "booster unit" having traction motors but using power supplied from the switcher or switchers.
   a. True b. False

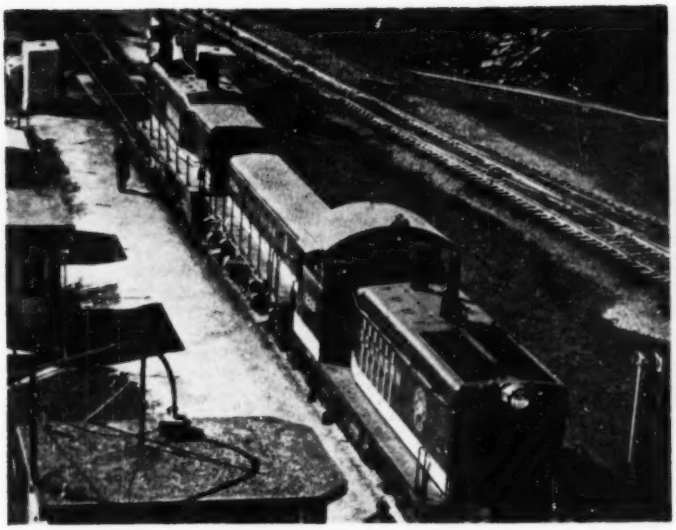
4. The tensile strength of gray cast iron is largely dependent on which of the following?
   a. Size and distribution of graphite flakes
   b. Method of casting
   c. Composition of the material

5. Spheroidal graphite iron provides which of the following characteristics not commonly found in gray cast iron?
   a. Low cost c. Ductility
   b. Wear resistance d. Good machinability

6. Lube oils with different types of additives frequently require different sight feed glass solutions in the mechanical lubricators to avoid clouding and/or carry-over.
   a. True b. False

7. Select two of the common bearing materials listed as being most vulnerable to corrosion.
   a. Tin c. Lead
   b. Copper d. Silver
   e. Aluminum

8. Fuel quality affects the type and amount of deposits.
   a. True b. False



"The Slug" is used between the "cow" and "calf" units of a two-unit switcher, as illustrated at the left. Above, we see the booster unit at close range.

The Slug

Here is a unit designed to boost the tractive effort of diesel-electric yard switchers at slow speeds while humping heavy cuts of cars.

WHEN engineers of the Southern Railway's mechanical department started on the design of a heavily weighted booster unit which consists primarily of trucks, traction motors, and ballast, it somehow acquired the name, "The Slug". This name stuck through the design and construction stages and during on-the-job tests which were recently conducted.

This booster unit is used between the two power units of an "A" and "B" unit switcher, as it has no power source of its own. Trucks and traction motors used in the construction of this unit are standard equipment, the same as used under diesel-electric freight locomotives.

For the body, a modified cast steel underframe from an old steam locomotive tender was used. This underframe supports the ballast which is built up of alternate layers of sawed-off rail ends and concrete. This ballast, which is necessary for traction, is covered by a fabricated hood which can be seen in the illustrations.

Equipment for "The Slug" consists of air brakes, hand brake, steps, hand holds, and all necessary safety appliances required by the ICC. Its total weight is approximately 250,000 lb of which 73,000 lb is for truck and traction motors.

Main generators of each diesel power unit supply electric current to six traction motors in series, four motors under the power unit and two motors in truck under the end of "The Slug". The traction motor blower is located in a cabinet underhung from body underframe at about the center. This blower is operated by direct current motors supplied with current from the auxiliary generators.

Gear ratio is 65:12 which under normal conditions would permit speeds up to 50 mph. However, in this case the hook-up of six motors in series, in each of the two groups, limits the speed to 9 mph when running light. For handling heavy cuts of cars up the hump at usual speed of 2 mph, "The Slug's" four extra motors increase the tractive power 50 per cent.

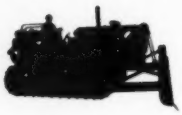
When this three-unit switcher is used on other yard jobs where the 9-mph limit is a hindrance, the engineer can cut-out the traction motors of "The Slug". Then he can make movements at about the same speed he would with a couple of loaded cars.

Southern had the benefit of experience of one or two other roads which have designed and built booster units somewhat similar. "The Slug" was built from blueprints at Southern's diesel maintenance and repair shop at Spencer, North Carolina.

It is likely that other similar booster units of this sort will be heard from on other railroads, as well as additional ones on the Southern. It provides additional tractive power where needed at much less initial cost than another complete diesel-electric unit, with maintenance and operating costs also being reduced. There may be other tough spots on branch line, industrial, or interchange tracks, where additional tractive power at slow speed for short distances, may be obtained by some such adaptation as described here.

Abstract of article from Ties, *together with additional data obtained in cooperation with the Public Relations Dept. of The Southern Railway System.*

Rock blasted from a ridge top above the dam is loaded into trucks with some bites being as big as 20 tons. Dozer shoves "Shot Rock" within reach of shovel. Note waste heat recovery system used on shovel radiator.



Even Hydro Power Starts With Diesels

Half a million cu yd of clay for the core of Kenney Dam will be taken from this clay pit. Rock and clay for the core of the dam are hauled to the site, sluiced down by hydraulic monitors and shaped into position by dozers (below).

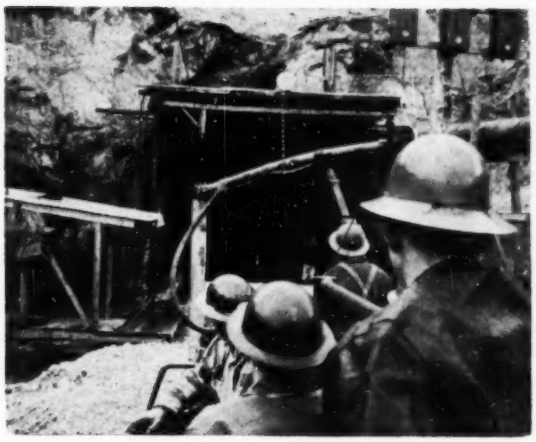
Aluminum Company of Canada's new manufacturing center is being carved out of the wilderness by diesels.

Known as Project British Columbia, this new aluminum manufacturing center will be the world's largest when complete. Spread out over an area of 5000 sq mi, the project has an army of men equipped with about $20 million worth of construction machinery. These men and machines are divided into six separate phases of construction at which work is carried on simultaneously around the clock.

If each phase of construction were to be set apart from the others it would be a sizable task in itself. Building the largest sloping clay core dam in the world is no small job and this is only part of the overall project. This dam will be the first large scale application of cementing the entire contract area between the clay core and the canyon walls through grouting and guniting.

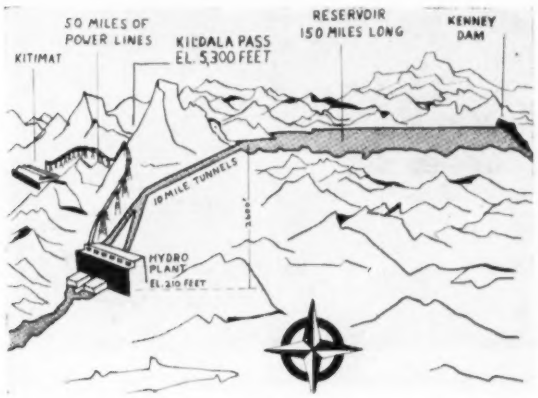
Backing up from this dam will be a natural reservoir of rivers and lakes over 150 mi long, draining an area as large as Connecticut. It is expected to take five years for the reservoir to reach capacity.

Water from the reservoir must be made to flow backwards and channeled through a tunnel 100 mi west of



At West Tahtsa miners are driving the principal water intake tunnel ten miles through the mountains to the powerhouse.

Down inside the mountain, a dozer works pushing out blasted rock. Note "scrubber" mounted on dozer to purify exhaust gases.



Shown above are some of the distances between the job sites. From Kitimat, where the smelter is being constructed, it is about 175 miles to the dam site.

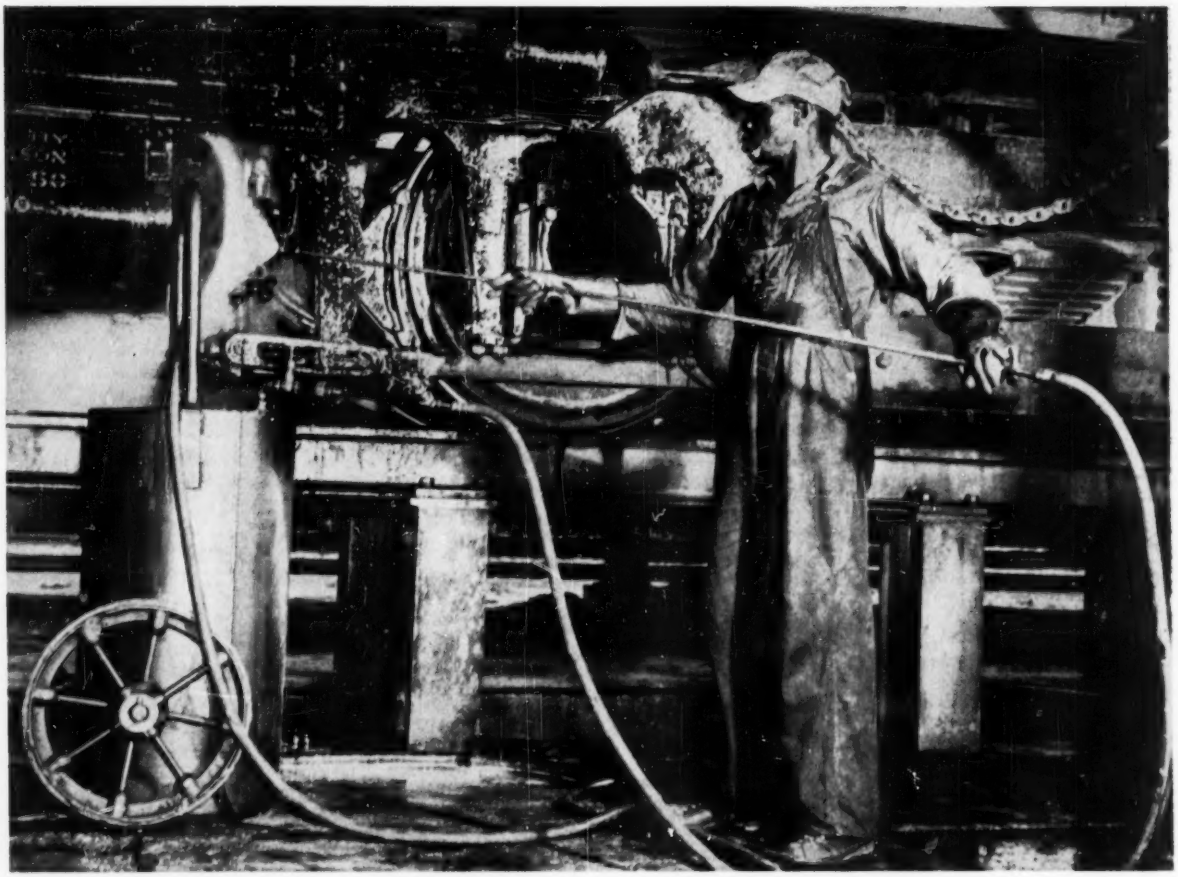
A mountain-top camp needed for construction of the transmission lines is isolated to the extent that it must be supported by helicopter.

the dam. These tunnels will be approximately 10-mi long and 25 ft in diam, descending down through the mountain with a drop of 2600 ft. At the lower end of the tunnels, an eight-story powerhouse, constructed inside a mountain, will turn water power into electrical energy.

From the powerhouse, electricity will travel through 50 mi of aluminum and steel transmission lines to Kitimat. Construction of these power lines is perhaps the most interesting phase in that one mountain-top camp must be supported by helicopter. This isolated camp is supplied with everything from diesel fuel to chocolate bars by an "air lift", operating with greater frequency than planes did in Berlin airlift.

At Kitimat, an aluminum smelter, 2½-mi long, is being constructed and with it, a city which eventually may house as many as 50,000 people. Electricity generated from water power will be used to power the smelter and the town. When complete, this city will have one of the best deep water harbors on the Pacific Coast, which will open up British Columbia (an area as big as France) for further development.

On top of Kildala-Kemano Pass dozers push through a snow field 60 ft deep to link with other sections of road being constructed down mountain.



Underframes are sprayed with a cleaning agent which is allowed to soak for a short period and then washed off.

Cleaning Diesel-Electric

By Wayne E. Lasky*

Adequate cleaning has many advantages, the more important of which are: reduction of fire hazards, promotion of more efficient and economical maintenance, and reduction of insurance premiums. All these contribute to trouble-free operation.

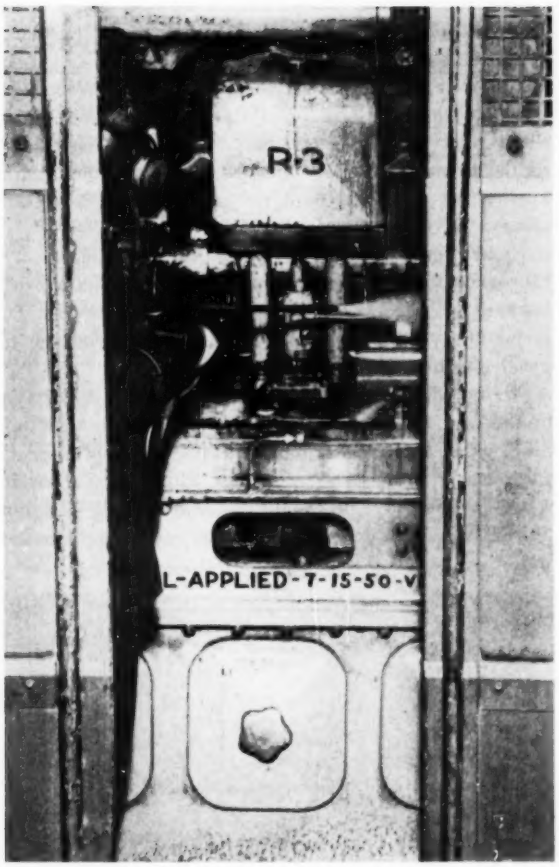
MANY changes in operating and maintenance practices, as well as facilities, are involved in the conversion of a railroad from steam to diesel. Complete change-over cannot be made overnight. Several years of careful planning, development of facilities, and efficient re-organization are necessary—during which some changes are of necessity accomplished by the cut and try method since there are few, if any, conclusive precedents for the many transitions required.

While some diesel locomotives have been in use on various railroads for periods up to 15 years or more, it is only in recent years that a few Class I railroads have become completely dieselized. While additional roads are well along the way to full dieselization, most other roads are at some stage in the process.

It is comparatively easy to organize maintenance schedules with only a few diesel locomotives in service. They are usually assigned to preferred runs and are available at the larger, better equipped, and more adequately staffed terminals for periodic maintenance. However, as a railroad approaches 100 per cent dieselization, and as units become older, the need for better and more thorough cleaning practices becomes more urgent.

Cleaning negligence oftentimes occurs as the number of diesel units increase at the maintenance terminals.

**Engineer of Tests; Gulf, Mobile and Ohio Railroad. Abstract of a paper presented before the Southern and Southwestern Railway Club at Atlanta, Georgia.*



Spraying between cylinders and behind fuel pumps is much easier than wiping by hand. This method reaches into places where fingers won't fit.

Locomotives

Three conditions may contribute to this neglect: (1) pressure on maintenance supervision to keep diesel availability high and maintenance expense low, in spite of spiraling labor and material costs; (2) lack of full appreciation of importance of diesel cleaning on the part of some supervising personnel responsible for maintenance and dispatchment; (3) diesel cleaning procedures usually are the last items on maintenance lists, and in the rush to meet dispatchment dead-lines, are handled hurriedly and inefficiently, or perhaps are omitted altogether.

This not only affects the over-all appearance of diesel power, but above all, contributes to fire hazards and inefficient preventive maintenance. As diesel equipment becomes older, it is more subject to lubricating oil, fuel oil, and exhaust leaks, thereby necessitating greater effort to maintain cleanliness.

Fire prevention can best be brought about by good housekeeping. The cost of fire insurance for this equipment is high, but if units are maintained in clean condition at all times, a reduction in insurance premiums may be effected.

A standard over-all cleaning program must be organized and all concerned instructed as to their part in carrying it out. Without such a program, even though the railroad personnel are aware of the importance of maintaining clean equipment, general cleanliness conditions will be unsatisfactory, or the cleaning costs will be excessive. There must be a definite plan outlining where and when certain cleaning operations are to be done.

Experiences and cleaning procedures on GM&O described herein, are presented as information, but not considered the optimum in cleaning methods as experiments are being made continually to improve procedures and reduce over-all costs. Much is still to be learned about diesel-electric locomotives, their operation and maintenance, before full benefits can be expected. If any of the items of the program are applicable to conditions existing in other railroads and prove helpful in solving similar cleaning problems, this effort will be considered worthwhile.

Complete dieselization was effected on GM&O in October 1949. It was then realized that although the cleanliness of diesels was far from satisfactory, the cost of cleaning, mostly labor, was excessively high.

In the engine room, it was found that many places not readily visible to the eye, were harboring heavy accumulations of oil, grease and dirt, due to inaccessibility. Such places as the Vee of the engine, back of the fuel pumps on some units, portions of the air compressor, air brake equipment, filter tank, and parts that could not be reached by hand, were not satisfactorily cleaned until time of overhaul. These places became definite fire hazards.

Trucks and frames were washed quite frequently but sludge deposits were found on and around the fuel oil tanks, on the running gear, and on the underframe; all potential fire hazards.

Running gear and wheel inspections were not efficient at times, due to accumulation of dirt on parts involved. The morale of forces responsible for inspection and repairs was at a low ebb due to handicaps in working on dirty equipment.

Desired improvement in cleanliness seemed to call for a thorough survey of the entire railroad, involving:

1. Study of the availability of diesels at different terminals for maintenance; also manpower available to perform work.

2. Study of different cleaning materials and methods of application, with preference for cleaning equipment and materials which would clean satisfactorily with a minimum amount of hand labor.

3. Selection of cleaning compounds that showed a minimum of corrosive action on metals and caused little deterioration of painted surfaces. Compounds found to be toxic, irritating to the skin or lungs, and which appeared likely to develop into health hazards were eliminated.

4. Selection of terminals, 14 in number, at which heavy cleaning would be performed on diesels.

5. Division of cleaning procedures into three major classes: (a) exterior of carbody; (b) underframe, including trucks, traction motors, fuel tanks, etc.; (c) interior, including diesel engine and all accessories in engine room, as well as floors and walls in engine room and cab.

6. Standardization of cleaning materials and equipment, as well as instruction covering the different procedures for the various kinds of equipment and classes of cleaning.

Exterior Cleaning

It was found that exterior carbody cleaning could be accomplished satisfactorily either by machine washing or by hand washing. Where car washing equipment was available, diesel units were passed through the washer with good results.

Although car washer equipment is primarily for passenger cars, no change in procedure is necessary. It is necessary, however, to have hand labor scrub the nose and aprons of the unit between application of cleaning material and water rinse, since brushes on the washer do not contact these surfaces.

Rinsing follows right behind washing on exterior of unit.

Trucks are rinsed with 150°F water under a pressure of 180 psi.

Hand washing procedures were adopted for about 90 per cent of the units, as only 10 per cent of the locomotives were available for handling through car washing equipment.

Two basic type cleaners have been found satisfactory, the acid type and the mild alkaline type, used according to the character of dirt to be removed. The acid-type cleaner is effective in removing road film dirt, brake shoe and rail dust, if the surfaces are not excessively oily or greasy. The mild alkaline cleaner is more effective for removing oil and grease, but continued use results in more loss of gloss in painted surface finish than is true of acid-type cleaners. Strong alkaline cleaners should never be used to clean a painted surface.

All acid-type cleaners tested were found to be corrosive to metals in varying degrees. Those with sodium acid sulphate base have been found to be more corrosive than those with an oxalic acid base. This has been proven both in laboratory tests and in actual use.

Due to corrosive characteristics of acid-type cleaners, some railroads have adopted the practice of pre-wetting all exterior surfaces with water before solution is applied. In this way, water will enter all cracks and crevices and any acid entering later will be considerably diluted.

An easy way to determine how much rinsing is required to remove acid or alkaline material, after cleaning application, is to determine the pH of a sample of drippings after rinsing is completed.

Hand washing procedure calls for application of a properly mixed solution with an ordinary car wash brush, beginning at the bottom panel and working upwards. This is followed with a fountain brush rinsing from the top panel down.

Mixing of cleaner should be under direct supervision of the foreman in charge. To insure correct strength, a drum of ready to use mixture should be kept near the wash track. This supply, together with easily accessible washing equipment, makes for efficient washing operation.

Application brushes used can be any of several standard car wash brushes. For ease in scrubbing lower and upper parts of unit sides, it is advisable to have both 5-ft and 10-ft handles.

Fountain brushes for rinsing should be oblong, about 11-in long by 3-in wide. This shape and size is more suitable than a round brush as it covers more area with each stroke. Any of the parts can be purchased separately as needed. Bristles are usually the first item necessary to replace and new brush elements are easily installed. Some suppliers give credit for the return of aluminum brush element block.

Sodium acid sulphate will react with metal quite rapidly when used without an inhibitor to retard reaction. Quite a number of inhibitors are available to manufacturers of cleaning compounds, and about the only difference in this type of cleaner offered by various suppliers is the inhibitor used in the mixtures.

Types of exterior finish used enter into the effectiveness of cleaning procedures to maintain clean and attractive exteriors. Most diesel units received from the builder are painted with lacquer, unless otherwise specified by

the purchaser since production line methods make lacquer preferable to enamel. However, tests indicate that exterior paint can be maintained longer if the units are given two coats of enamel and covered by two coats of varnish. Cost of repainting units with enamel and varnish is also less, due to less labor involved.

A protective coating for lacquer is now available. It is colorless and forms a hard surface that does not chip and has good resistance to acids and alkalies. Field tests of over a year and one-half have proven its practicability. The material was applied to four different units which had not been painted for over two years. The application returned the painted surfaces to almost their original color and left them glossy. The units are still in service and can be easily recognized since they have a higher gloss than average units not yet repainted.

Underframe Cleaning

Underframe cleaning of diesel units present the same problems as those of steam locomotives, although trucks and traction motors accumulate more oil, grease and dirt.

Parts of the locomotive to be kept clean include not only the underframe of carbody, with attachments, but also the running gear and traction motors. Accumulation of oil, grease, and dirt should not be allowed to collect. Fire hazard is too great and inefficient pit inspection may result because defects are concealed under layers of greasy dirt.

Wheel failures, two of which resulted in serious derailments, are regarded by the I.C.C. Bureau of Locomotive Inspection as perhaps the most serious potential hazard in diesel operation. The Bureau has a record of more than 50 wheels which have been found defective in the last two years. Railroads are urged to give most serious consideration to frequent, comprehensive inspection so that defective wheels will be removed from service before the danger point is reached.

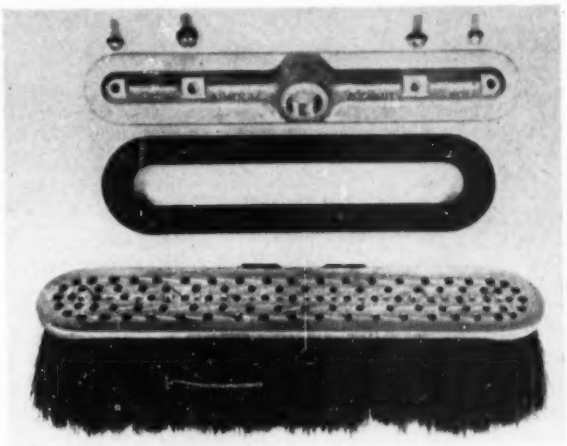
One method of underframe cleaning employs an emulsifying type grease solvent cleaner, mixed with fuel oil in a 1 to 4 proportion. After being applied with a fan type spray, it is allowed to soak for a short period and is then flushed off with water.

The solution (20 gal per unit) is forced from an air pressure tank, using a stand pipe, into a 20- to 30-ft long neoprene hose which is fitted with the spray nozzle. Size of spray is controlled by a hand valve. Some training is necessary to see that spraying is properly done and that it reaches every portion of the surface of underframe and attachments.

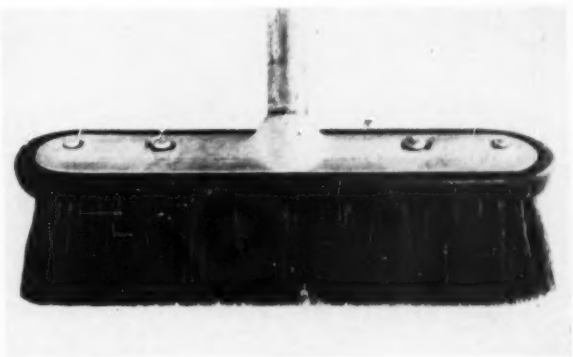
After cleaning solution has been applied, and before flushing operation is commenced, the engine is started and operated in third or fourth notch throttle position so that traction motor blowers will prevent moisture from entering motors.

All units owned by GM&O may be thoroughly cleaned underframe, by working from ground level. Some roads report that other types of units must be handled over pits for thorough cleaning since there are places that can only be reached from a pit.

Shown above is equipment used for interior cleaning at Mobile, Alabama shops.



Fountain brushes of the oblong type are perhaps the best suited in that more area is covered with each stroke. With this type, parts can be replaced as needed.



The other method uses hot water of about 150°F and 180 psi pressure, without addition of chemical compounds. Hot water at this pressure is applied through a double taper spray nozzle. It will remove any paint that is not well bonded to metal or paint that has been applied over a dirty surface. Parts can be cleaned satisfactorily enough for repainting after being allowed to dry.

If a thin gray or brown "road film" remains on painted surfaces after cleaning, objectionable only for appearance, it may be removed by spraying with a chemical of the strong alkaline type. This may be called heavy vat-type cleaning, and a quick flushing brings back the luster of the paint.

A small amount of cleaner and also fuel oil was introduced into the hot water, but no advantage was noticed. Therefore no chemical at all is used with this process.

The method is only used at Bloomington, Illinois, where there is an abundance of hot water from a power house. The hot water is piped through an insulated pipe and circulated through a return line to maintain water temperature. A booster pump is used in the line to maintain adequate pressure.

Each of the six hot water stations consists of a stop and waste cock type outlet in an underground pit, covered with a wooden platform. Each outlet has a 30-ft length of 1-in hot water hose to which a ½-in length of pipe is attached, with handle welded on.

Time for one man to clean running gear, underframe, fuel tank, traction motors and other underneath parts, averages about one-half hour. Maximum amount of hot water delivered at each station varies from 28 to 30 gpm.

Interior Cleaning

Interior cleaning of diesel units presented an entirely new problem. In order to develop practical, effective cleaning procedures, it was necessary to conduct many field tests using different types of cleaning materials and methods of application and removal. It was necessarily by the trial and error method.

Previously, engine room cleaning has been done by hand wiping, with occasional hand washing of ceiling and walls. Many places in the room could not be reached by this method. The over-all cost, mostly labor, was excessive and still the rooms were not satisfactorily clean.

The final method adopted consists of spraying the entire inside: ceiling, walls, engine, mechanical accessory equipment, and floor, with the same type emulsion cleaner used on underframes. The same spray gun, an air operated vacuum pick-up type, is used to spray cleaner and to rinse with hot water.

The cleaning compound is mixed with fuel oil in 1:3 proportion. A total of approximately 27 gal of mixture is required to completely clean the average engine room. Protection of main generators, traction motor blowers, electrical starting panel, and governor, is provided by covers fabricated from heavy canvas; carbody filters are removed; all doors to outside opened; and air movers are placed in unit.

In application, operator works downward. Flushing is then done with hot water spray. If soil is heavy and consists mostly of dry carbon, scrubbing is necessary before rinsing.

Equipment and material should be readily accessible, arrangement depending on facilities. At Porter Shop, Mobile, Ala., diesel ramp, two drums, one filled with mixture and one with hot water are used. Each drum is covered with a lid and connected with a line running underneath full length of platform. Valve controlled outlets are located in both lines. The spray gun has an air hose and a solution hose with fittings for attachment to the air and solution supply lines at each station. Operators need only turn on air supply and carry gun into engine room to begin spraying of cleaning solution. When ready to rinse with hot water, the hose is shifted from solution drum to hot water drum.

An air-operated vacuum pick-up type gun has been used for the past two years. It gives satisfactory service if kept in good repair and if cleaner solution supply line is kept free from waste. Spray pattern of this gun is round in shape, rather small, and requires considerable time to cover a given area. Another type of gun which shows considerable promise has been undergoing field tests recently.

Another method of applying solution is to use the same type pressure tank system used to spray underframes. This is faster, less "fog" is produced, and working con-

ditions are improved. Rinsing is done with a gun made entirely of pipe fittings with exception of nozzle, which produces a fan-type spray. Operation requires both compressed air and hot water. Ratio is controlled by valves on the gun. Fan pattern of spray allows much faster coverage of area to be rinsed and the needle-like spray dislodges soil. The gun reduces time required for water rinsing by 15 to 25 per cent.

Apprehension as to electrical troubles which may be caused by so much spraying is likely to arise. However, the volume of water used is quite small and its application is spread out over an hour or two. Spraying in the engine room is not done with a stream of water as when sprinkling a lawn, but by an air blast water mist well under control as to places it hits. It is always directed away from electrical cabinets even though electrical parts are covered with heavy tarpaulins.

Electrical ground troubles have not resulted from this system of cleaning except as has been caused indirectly. An improperly constructed electrical cabinet left with a space just above floor line will allow water on floor to enter cabinet. This space may be closed by welding. Ground trouble may result if insulating material in ends of cable conduits are not kept in place. If maintenance is kept up as it should be, and if cleaning procedures are carefully carried out, no electrical troubles will be caused.

At the left are shown two types of vacuum pick-up spray guns, the one on the extreme left being available commercially and the other being fabricated from pipe fittings except for the nozzle (right) and valves.

Electrical maintenance and cleaning in engine room is handled on a mileage basis. This schedule has been reduced for air blowing from once every 6000 mi to once every 3000 mi. Electrical cabinets are blown out with dry air (or cleaned with vacuum machines on some roads), and then wiped by hand using a solvent on lintless rags.

Main generator cleaning, while on the unit, has not yet been satisfactorily solved. Three methods were used for approaching this problem.

1. *Spraying a solvent on contaminated surfaces.* However, no solvent has as yet been found to have the five definite characteristics required: (a) must be non-toxic; (b) must have high flash point; (c) must be a solvent; (d) must be a cleaning agent; and (e) must evaporate rapidly without leaving an oily residue.

2. *Blowing ground-up corn cobs or corn meal.* This cuts through the contamination without much damage to the insulating varnish, but it was found that some residue remained where it could not be removed even with a vacuum cleaner and caused trouble later on.

3. *Preventive measures.* More stress was placed on cleanliness of unit, reducing amount of dirt. Measures included better maintenance of equipment that may allow oil fumes to get into the engine room; keeping outside doors closed at all times to prevent road dirt from entering engine room; and better maintenance of carbody and engine air filters, using a dripless oil on generators located below engine air intake filters.

While the preventive measures, along with more frequent blowing out of electric equipment, have improved conditions and resulted in less flash-overs, the problem still remains unsolved. A suitable solvent is still being sought.

A schedule of cleaning for the entire diesel unit on either time or mileage basis has not been found practical. Time required to clean carbody exterior and underframe and trucks was about 1¼ manhours each and engine room interior took about 20 manhours. Now, due to cleaner condition of units, outside and inside time is 30 min, and interior cleaning has been reduced to 10 to 15 manhours. However, the unit cannot be held long enough for an entire engine room cleaning at one time, particularly if there is other work to be done on it. In many instances, too, carbody, underframe, and trucks need cleaning several times between engine room cleaning periods.

The mechanical foreman is responsible for inspecting unit and designating sections to be cleaned in time available at terminal. Report of cleaning is made to a central office, using a printed form arranged for checking off sections cleaned, place, and date. In the office, a composite report is tabulated to enable supervisor to follow progressive cleaning and to evaluate work.

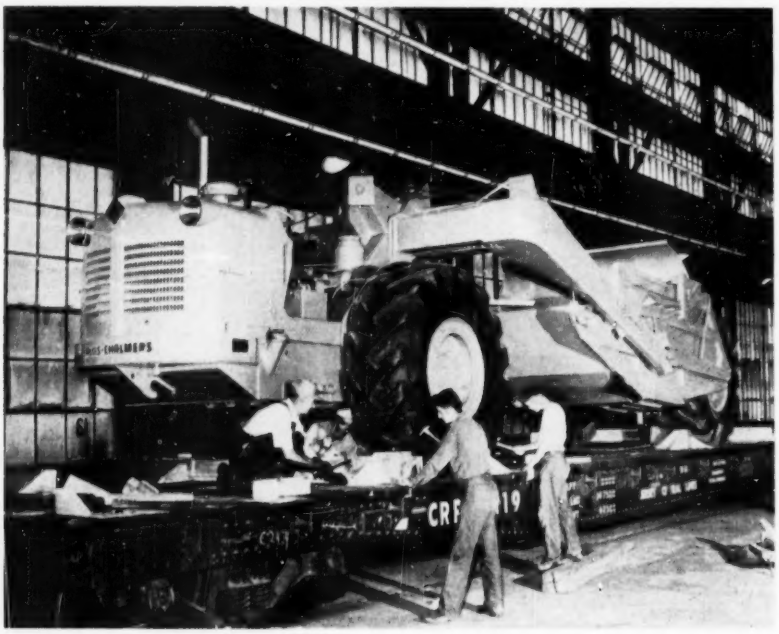
These reports have disclosed irregularities. Some units were being cleaned several times as often as others. Air brake equipment and other sections were neglected. These conditions are hard to control and are aggravated by the fact that most road units do not have a definite home terminal and responsibility for maintenance and cleaning is shared by eight or nine terminals.

Summary

GM&O does not claim to have the cleanest diesel locomotives in operation. However, over-all improvement in cleanliness during the past two years has been remarkable. At one time, many conditions were found, on inspection, to be of the kind Federal inspectors take exception to. Occasionally, it was necessary to hold units out of service until hazards were removed.

Reduction of insurance premiums on equipment amounting to $55,000 per year was announced recently due to the cleaning program. Net savings after deducting cost of labor and materials is somewhat less, but is a substantial dividend of the cleaning program. This reduction in insurance followed a two week survey of all diesel power on the railroad by a fire prevention engineer from the road's insurance underwriters.

DIESEL BRIEFS



A-C Enters Motor Scraper Field

Recently another addition was made to the Allis-Chalmers line of industrial equipment, which includes diesel powered crawler tractors, motor graders, industrial wheel-type tractors, and power units. This addition was the model TS-300 motor scraper.

This unit was the first to be shipped from the company's Cedar Rapids, Iowa, works. Formerly, the Cedar Rapids plant was the LaPlant-Choate Manufacturing Company, which has been acquired by A-C. Shipment of this equipment officially marks the entrance of the company into the motor scraper field.

Electrical Engineers to Hold Land Transportation Sessions

Operation and maintenance of diesel locomotives will be covered in technical sessions at the winter general meeting of the American Institute of Electrical Engineers in the Hotel Statler, Jan. 19-23, according to a recent announcement.

The land transportation sessions are among more than 60 that will be held on various aspects of electrical engineering which is expected to be attended by 4,000 engineers from many parts of the world. Authors from leading railroads and industry will present papers on diesel locomotive design, repair and maintenance.

Diesel Service Station Opens New Branch

Diesel Injection Sales & Service, Norfolk, Virginia service station, has just opened a new branch in Salem, equipped to service all makes of diesel fuel injection equipment as well as Woodward hydraulic governors. The company expects to serve the agricultural trades, contractors, motor fleets, and strip mining operators in the territory.

Mr. Bernard Nunnally has been appointed branch manager, recently returning from the factory where he was indoctrinated in the latest changes and improvements in American Bosch fuel injection equipment.

$26,400,000 in Improvements For Great Northern Railway

Expenditure of $14,400,000 for new equipment and $12,000,000 for track improvement in 1953, was authorized by the board of directors of the Great Northern Railway.

The new equipment includes 25 diesel-electric locomotives costing more than $6,000,000. These will be four of 6000 hp each for freight service, 16 of 1500 hp for road and switching duty, and five of 1200 hp for switching. The track program includes purchase and laying of 50,000 tons of 115-lb rail with necessary fittings.

LaPlant-Choate Bought By Allis-Chalmers

Allis-Chalmers Manufacturing Co., Milwaukee, Wisc., has acquired the LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa. This makes the Cedar Rapids plant the eleventh one in the United States for Allis-Chalmers, now in its 104th year.

Liberal Education, Engineering Plan Offered by Columbia U

The School of Engineering of Columbia University has set up a plan to combine liberal arts education with engineering.

Under the plan a prospective engineering student may attend one of a number of liberal arts colleges associated in the program, and after three years enter the university's school of engineering for two years. Upon satisfactory completion of this five-year program, he is eligible for a liberal arts degree from the college of his origin and a science degree in engineering from Columbia.

Extend Student Design Award

The Heli-Coil student design award program, announced in the November issue of DIESEL POWER, has extended its closing date to midnight March 15, 1953.

DIESEL BRIEFS

American Diesel Service Moves

American Diesel Service of Cleveland, Ohio, specializing in rebuilding of fuel injectors and fuel transfer pumps for GM diesels, announces removal to larger quarters at 3495 West 140 Street.

150th Anniversary for Scaife

Scaife Company, oldest manufacturing firm in the U. S., west of the Allegheny Mountains, is celebrating its 15th decade this year. An "open house" for employees and their families formally opened the new Scaife office building in Oakmont, Pa. and marked the occasion. Founder of the company, which has passed through five father-to-son generations, was Jeffrey Scaife, maker of tinware and japanned ware, in Pittsburgh.

Diesel Power, Inc. Expands

Diesel Power, Inc. of Pittsburgh, has contracted for the erection of an additional building on its Camp Reynolds 8-acre plot near Greenville, Pa. The building will be used for assembling and testing of the company's improved type diesel engines and will include a modern wind tunnel.

This will be the second structure added to facilitate the production of diesel engines since the company's purchase of the plant of the Industrial Machine Co., last July.

Kellogg Co. Wins Contract For Large Deasphalting Unit

The Humble Oil & Refining Co. has awarded the M. W. Kellogg Co., New York City petroleum and chemical engineer-contractors, the contract for the design and construction of a solvent deasphalting plant at Humble's Baytown, Texas refinery. Said to have twice the capacity of any deasphalter heretofore designed, the plant will charge 28,000 bbl per day of vacuum reduced crude.

Diesel Supplies Power Utility Can't

This 900-hp 12-cyl model 567 GM diesel unit with a 500 kw generator, was recently delivered to the Pilot Rock Lumber Company of Pilot Rock, Oregon by the Zidell Machinery & Supply Company, Portland.

At present, Pilot Rock is using electrical power supplied by Pacific Power & Light Company. The new power unit will be used to supplement power required by a newly installed debarker machine. Load requirements now make them able to operate this debarker only during off peak hours. The diesel unit will act as a temporary supplier of power until the electric company has completed its 18½-mile transmission line into the area.

This is the second delivery of these large power units by Zidell, in a short time. The first of these units is being used in Washington on construction work of the new Yale dam out of Battleground.

General Motors Offers Awards

General Motors is offering $194,000 in cash awards for the best ideas on getting America's highways and traffic systems "out of the muddle". One hundred sixty-two national, regional, and state prizes are offered, topped by a $25,000 first place national award. The contest closes at midnight, March 1, 1953.

Foxboro Expands at Dallas

New factory facilities for the assembly of control valves were recently acquired at Dallas, Texas, by the Foxboro Co., Foxboro, Mass. The new quarters almost double the area devoted to valve assembly and warehousing.

1,192,000 Bolts, Nuts And Washers for Tube

The Port of New York Authority awarded a $491,849 contract to the Pittsburgh Screw and Bolt Corp. recently for 1,192,000 nuts, bolts and washers to fasten the 2,023 cast iron rings forming the outer shell of the under-river segment of the third tube of the Lincoln Tunnel connecting New York and New Jersey.

Delivery of the 298,000 high tensile steel bolts, 298,000 nuts, and 596,000 washers will start in January and take ten months to complete. The two-lane addition to the present twin tubes of the Lincoln Tunnel is due to be completed in 1957 and will cost $90 million.

Today, clearing "Stump Ranches" is no longer the task it used to be. In place of black powder and muscle we see diesel-powered equipment doing a faster and more effective job.

Low Cost Land Reclamation

By Robert H. Forbes

AT ONE time "Stump Ranches" were a common sight in the mountainous section of Idaho's panhandle. However, with the use of large diesel-powered equipment and modern methods, stumps are disappearing from Idaho's landscape.

Lumbermen of long ago left in their wake thousands of acres of stump land here. Then, livestock farmers moved into areas to eke out a living on farms which would have supported twice as many animals, if only they were not covered with stumps—sometimes running into the hundreds per acre.

Land-clearing mistakes made in the nineteenth century land boom in the Lake States—grubbing out stumps for farms on land which could only grow forest trees—are being avoided in northern Idaho.

Soil surveys of the federal Soil Conservation Service "discovered" this land that was not being put to its best agricultural use. Only 50,000 of 130,000 acres of good farm land in Bonner County, Idaho, had been completely cleared prior to 1951. One hundred thirty-thousand acres of uncleared stump land were found to be in capability classes II, III, or IV, much of it good crop land; all of it at least suited for improved pasture to help increase the area's importance in the dairy farming picture.

Surveys disclosed that a similar land situation prevailed in Boundary County, immediately to the north of Bonner County. However, it was not until 1950 that serious thought was given to this undeveloped resource by Charles Freesh, a vacation-time visitor from California. Large earth-moving jobs on which Freesh had gotten experience, in southern oil-well districts, made northern Idaho attempts at land clearing of two years ago seem pitifully inadequate.

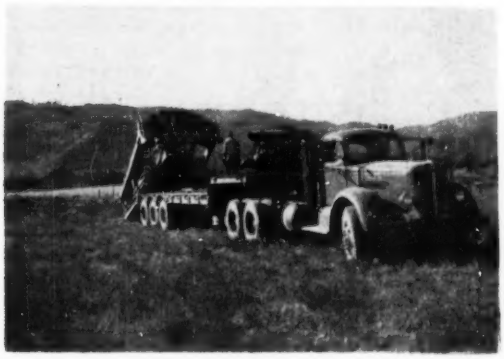
A single small bulldozer clearing stump land was as out of keeping with modern trends as the teams of horses and blasting powder used 20 years ago.

The Freesh Construction Company was then formed and, with only part of its present equipment, cleared 600 acres of stump land in the two counties in 100 days in 1951, its first year. Two International TD 24 tractors, slightly smaller TD 18 and T 18 tractors, two large flat-bed trucks to haul land-clearing equipment from job to job, and a 1½-ton truck for servicing tractors with fuel and repairs, cleared for the company 1000 acres of stump land in a 150-day 1952 season.

"Methods of the Freesh Company not only get the land much clearer than those used formerly," states Edwin Nurmi, work-unit conservationist of the Bonner County Soil Conservation District, "but there is also less land preparation required for a crop of grain or grass."

The two largest tractors, equipped with 10-ft 5-in brush blades, progress in a swath across a field to be cleared of stumps a little faster than a man can walk. They pause only a second when they come to and uproot a small living tree in their path; hardly at all when an average-sized stump is encountered.

Shown above is one of the land clearing tractors with a brush blade mounted on the front.



For transporting equipment from one job to another, a large diesel-powered tractor-trailer is used.

A 1½ ton truck carries fuels, lubricants and tools onto the job site for servicing equipment.

Below, stumps and brush are piled on the cleared land. Charred stumps can be seen in the foreground.

Extra-large stumps may require more than one pass of a tractor, the first one or two of which split it. These stumps leave a large hole to be filled, but this is not much of a problem to a TD 24 operator. He merely backs his machine, swings its blade through a few degrees of an arc and then fills the hole with earth.

Uprooted stumps, small trees, shrubs and sod lay on the ground wherever they fell. In the second or "sweeping" stage of land clearing, a smaller tractor pushes accumulated debris into windrows or piles to become thoroughly dry before burning by the landowner.

Piled stumps take up only about 10 per cent of the cleared area making it possible for a farmer to plant a crop on 90 per cent of his "new" land before burning.

Dairy farmer John Hickey has had 30 years of experience clearing land in Bonner County and is completely sold on the Freesh method. "Greatest boost that ever came to the farms of this area," he states. Thirty acres of Hickey's land were cleared by tractors in less than a week—a job which would have required at least two seasons of backbreaking labor when Hickey began improving his farm.

Three principal areas of stump land in the two counties are at least 25 highway miles apart and tractor travel, even for a mile or two on a side road, is prohibited by law. Road travel of tractors is also too slow for the well-planned timetable, so machines are moved with the help of a flat-bed winch truck and a large model 200 White diesel powered truck with 36 ft trailer.

The tractor for this rig is of the 3-axle class with the trailer also having 3 axles, 22 wheels in all. It is ideal for travel with 25-ton loads both on and off the sometimes primitive roads that must be travelled.

M. R. Johnson, company service man, has developed a workshop-trailer to follow tractors onto clearing areas. Greases, oils, parts, tools and acetylene welding equipment constitute workshop contents.

A Lincoln arc welder is also required on land-clearing jobs for repairs and, at 1000-hour intervals, hardfacing the working tips of brush blades. Manganese steel of blade tips is reinforced with stainless steel welding rod in hardfacing. The rod is bonded to the tip by running strips from another, molybdenum welding rod up and down its surface and that of the tip. The arc welder is also used as a power plant for illumination on repair jobs after dark.

"I wish that it had been possible for us to get 100 per cent diesel equipment," states Charles Freesh. "Our three diesel tractors and one diesel truck have not only done their jobs well, but have also proved more economical. We are not in business for our health, you know, although the gratitude of farmers is a lot of compensation."

Plans are already in the works for 1953. The expected purchase of more equipment, diesel if possible, will allow the company to uproot stumps and level land on 1800 acres of land in the two counties another year.

Today diesel-powered machines are helping the derisive term "stump ranch" ease out of the language in extreme northern Idaho.

Lubricating Large Engines

*by Brian Corrigan**

Today, when more and more is being asked of engines, many problems are encountered in their lubrication. Here, the author presents a factual basis for overcoming some of these problems.

IT is generally accepted that "water and oil won't mix". Fifty years ago the first diesel engine, the first large internal combustion engine operated in this country, was lubricated with a mixture of oil and water, mostly the latter. The crankcase was filled with water up to the lower level of connecting rod travel and on top was added about 2 in of heavy mineral cylinder oil. Crankshaft and piston pin bearings were splash lubricated with this oil and water mixture. Actually, the water, which quickly formed an emulsion with the oil, acted as a cooling medium and by its evaporation kept bearings and other engine parts at desired temperature levels.

Water is still a factor in the lubrication of modern large engines and one which must be contended with from several different angles. In addition, there are other problems associated with lubrication of large engines. It is the purpose of this article to discuss from a practical viewpoint some of the more important of these.

Cylinder Lubricators

Many of the larger engines are equipped with dual lubrication systems; i.e. pistons and cylinders are lubricated by direct injection of fresh cylinder oil and the remainder of the engine is lubricated with crankcase oil. In some designs, one oil can be used to lubricate cylinders and crankcases, the oil being pumped from the latter through filters to lubricators which in turn feed it to the cylinders.

In other designs only new oil is handled by the cylinder lubricators. In either case, each engine cylinder is equipped with one or more sight feed lubricators located near the top of piston travel. The term sight feed means that oil delivery in drop form can be observed through sight glasses containing a transparent liquid through which the oil is pumped. Knowing the approximate oil drop size, some idea of how much oil is being delivered to engine cylinders can be estimated from Figure 1.

Water or mixtures of water and glycerine are the most common fluids used in sight glasses of cylinder lubricators. Glycerine is used at locations where the ambient temperatures may drop below the freezing point of water. Straight mineral oils can be fed through water and water-glycerine solutions for long periods of time without undue carryover of the solution.

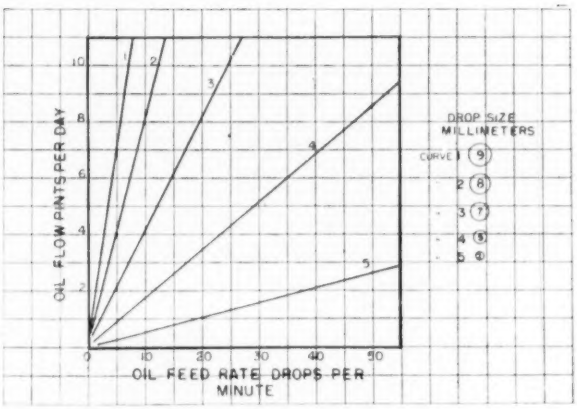


Fig. 1

The same does not always hold true when additive oils, particularly those containing detergent or dispersant components, are used for cylinder lubrication. Additives used in such oils make the oils more water sensitive than straight mineral oils. This means that heavy duty detergent oils when fed through water or water-glycerine solutions in sight feed lubricators can result in any one or all three of the following effects.

1. Excessive carryover of solution due to absorption of the oil.
2. Clouding of the solution due to reaction with the oil additives.
3. Larger oil drop size due to low interfacial tension between the solution and oil. (See Table A.)

It is evident from the foregoing that feeding additive oils, containing detergents, through sight glass lubricators poses a problem for operators of large engines. Certainly, it is a time consuming and messy job to have to remove and clean numerous small sight glasses more often than necessary to say nothing of the down time on the engines

**Technical and Research Division, The Texas Company, New York, N. Y.*

TABLE A
Interfacial Tension Data

Product (SAE 30 Grade)	*Interfacial Tension dynes/centimeter*
Heavy Duty Oil A	5.3
Heavy Duty Oil B	10.6
Straight Mineral Naphthene	31.6
Straight Mineral Paraffin Residual	36.5
Straight Mineral Paraffin Distillate	39.4

TABLE B
Sight Feed Lubricator Tests
Heavy Duty Oil A

Solutions	*Solution Carryover inches/100 hours*
Water	0.371
Calcium chloride	0.195
Sodium chloride	0.438
Calcium Nitrate	0.115
Ethylene Glycol	1.228
Barium chloride	0.127
50:50 glycerine and water	6 (Approx.)

TABLE C
Bearing Corrosion Properties

Bearing Metal	*Composition*	*Remarks*
Lead or lead-tin coatings	Pure lead or with up to 10% tin	Pure lead easily corroded. 6% tin prevents corrosion. Some additive oils in presence of water, corrosive to lead-tin coatings.
Lead-base babbitt	70-90% lead plus tin and antimony	Added tin and antimony reduces corrosiveness.
Tin-base babbitt	80-90% tin plus copper and antimony	Non-corrosive.
Silver-hardened lead	Lead-base babbitt with 2-5% silver	Added tin, antimony and silver reduces corrosiveness.
Arsenic-hardened lead	Lead-base babbitt plus 1-3% arsenic	Added tin and antimony reduces corrosiveness.
Calcium-hardened lead	Lead with small amounts of tin and calcium	Corrosive. Presence of water not helpful.
Cadmium	Cadmium with small amounts of nickel or silver	Corrosive with badly oxidized oil.
Copper-lead	60-75% copper, balance lead	Corrosive – lead present in pure state.
Silver	Either pure or with small amount of lead	Non-corrodible except by certain types of additives.
Aluminum	90-95% aluminum, balance tin	Non-corrosive.
Lead-bronze	75-85% copper, balance tin and lead	Non-corrosive.

involved. Such a problem is not difficult to solve, however, and lubricator solutions have been found which will provide the desired services for particular additive oils. Table B lists some representative results using this equipment.

Unfortunately, no one lubricator solution has been discovered that will work acceptably with all makes and types of additive oils. In addition, it does not appear probable that the ideal solution will be developed in view of the great variety of chemicals that are and will be used in additive oils of the heavy duty, Supplement I and Series II classifications.

Bearing Corrosion

Bearing corrosion has never been a problem of major concern to manufacturers or operators of large engines. The reasons for this are:

1. Relatively low bearing loads.
2. General use of bearings relatively insensitive to corrosion such as tin base babbitt.

For the most part bearing corrosion is associated with bearings containing lead either in alloy form, such as lead base babbitt or in the pure state as in the case of dispersed lead in copper-lead mixtures. Pure lead is easily, though slowly, dissolved by some of the lower molecular weight organic acids which result from oil oxidation.

Bearings which contain lead in pure form are therefore much more readily corroded than those in which lead has been alloyed with such elements as tin, antimony or silver. Table C lists the more commonly used bearing materials and it will be noted that all but a very few can be corroded as a result of oil deterioration. All lead-containing bearings with the exception of tin base babbitt and bronze are corrodible as well as are those made from silver.

It is generally understood that the term corrosion involves chemical reaction. In the case of bearings containing lead, this is the dissolving of lead by low molecular weight organic acids as explained above. Figures 2 and 3 are photomicrographs which illustrate cases of slight and severe corrosion of copper lead bearings. The grey areas in the copper-lead structure represent lead while the white areas represent copper. Note that only a small amount of lead has been removed at the surface of the bearings shown in Figure 2 whereas practically all of the lead is gone from the bearing illustrated by Figure 3.

For silver bearings it is the chemical conversion of silver to silver sulfide followed by removal of the sulfide material in much the same way that household silverware deteriorates over the course of time. Figure 4 illustrates this condition.

In large engines considerable quantities of oil are required for crankcase lubrication. Most engines in this category use straight mineral oil for this purpose—not only because it is more economical but also because with good filtration it is general practice not to change oil unless it becomes excessively contaminated with fuel or water or until engines are overhauled. Straight mineral oils used for crankcase lubrication are derived from either naphthenic or paraffinic stocks.

Each type of oil is subject to oxidation but the results of oxidation differ in so far as their effect on bearing corrosion is concerned. Paraffin distillate oils initially oxidize to form low molecular weight organic acids which readily dissolve lead from lead-containing bearings. Naphthene base oils oxidize to form sludges which have a tendency to coat bearing surfaces with varnish or lacquer thereby protecting bearings from possible attack by organic acidity.

While naphthene oils are potentially less corrosive to leaded bearings than paraffin distillates, the latter type is preferable in engines where crankcase oil temperatures run above 150°F because of their better inherent ability to resist thickening or viscosity increase in service.

TABLE D
Corrosion Test Results

Oil	Weight Loss—mgs. Pure Lead No Water	Pure Lead 2% Water	90:10 Lead-Tin No Water	90:10 Lead-Tin 2% Water
Heavy Duty A	0.0	0.5	0.0	0.0
Heavy Duty B	1.0	15	0.3	0.5
Heavy Duty C	1.1	34	0.0	1.0
Heavy Duty D	0.0	50	0.0	0.3
Heavy Duty E	2.0	75	0.5	29.5

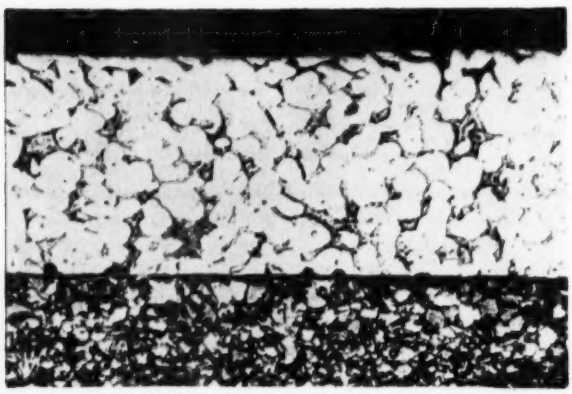


Fig. 2 Copper-lead bearing—slight corrosion (200X)

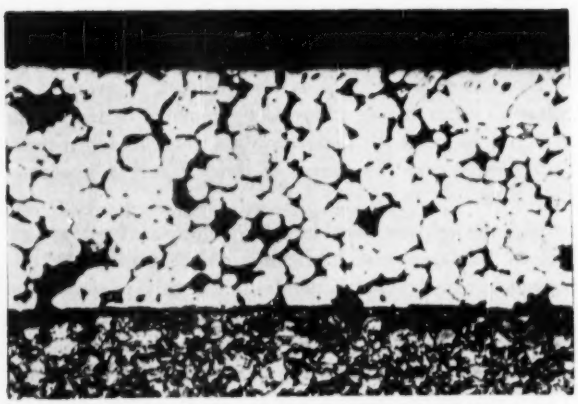


Fig. 3 Copper-lead bearing—severe corrosion (200X)

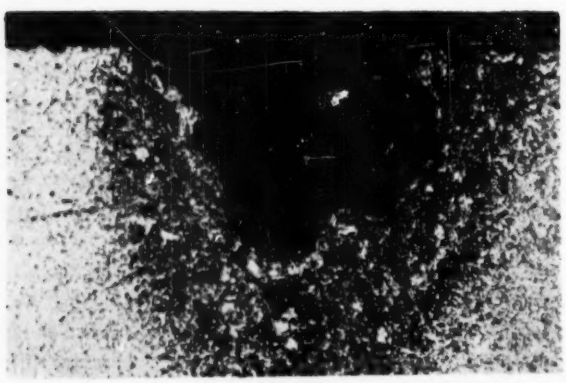


Fig. 4 Silver bearing—moderate corrosion (250X)

As a matter of practical application, there are many engine crankcases lubricated with naphthene oils at crankcase oil temperatures at or below 150°F with excellent results. In such cases, bearing corrosion is not a problem even though bearings of the copper-lead type are in use.

A minor and little recognized phase of bearing corrosion involves oil contaminated with water. While oil and water do not get along too well together, some oils are more affected by water contamination than others in so far as bearing corrosion is concerned. Table D shows pertinent information along this line.

It will be noted that some additive type oils, when contaminated with water, corrode lead and lead-tin materials to a much greater degree than others.

While bearing corrosion has not been and is not a problem for present day operators of large engines, such a possibility must not be overlooked with the advent of new and higher output engines. Guarding against bearing corrosion is a lubrication responsibility of bearing and engine manufacturers along with the oil industry.

Engine Deposits

From a practical consideration, engine deposits can be divided into two categories. Those that cause engine malfunctioning and those that do not. While engine cleanliness is a desirable objective, the engine itself is not concerned unless deposits interfere with its normal breathing or digestive functions. Varnish or lacquer films which occasionally form on cylinder walls, piston skirts, crankshafts and connecting rods, for example, do not as a general rule impair engine operation. Actually, such deposits can be beneficial in that they serve as a protective film against rusting or corrosion during periods when engines are out of service.

On the other hand, deposits which accumulate in cylinder ports, on valves, in piston ring grooves and in the combustion chamber are objectionable and if not guarded against can lead to operating troubles. Such deposits result from incomplete fuel combustion combined with lubricating oil decomposition. Accordingly, the formation of objectionable deposits is influenced by:

1. Fuel quality.
2. Manner of combustion.
3. Oil quality.
4. Manner of lubrication.

In so far as fuel quality is concerned, what is left after the fuel is burned is the important consideration. Fuels of high carbon residue and those containing ash materials, i.e. fuels of the residual type leave more deposit forming ingredients behind after combustion than do distillate fuels. While these materials are supposed to go out the exhaust not all of them do. Residual fuels containing vanadium, nickel, sodium and other metallic compounds are particularly bad offenders and it is practically impossible to remove such compounds before the fuel is burned by normal centrifuging or filtering. Table H shows results on a typical heavy fuel containing vanadium before and after having been centrifuged.

TABLE H

Metal	ppm Before Centrifuging	ppm After Centrifuging
Vanadium	390	390
Iron	3	3
Nickel	42	43
Sodium	4	4

Note that there was no reduction in metallic contamination as a result of centrifuging the fuel, which means the metals are combined with other materials, the resulting compounds being soluble in the fuel. Engine deposits containing components originating from residual fuel can be very hard and abrasive. In some cases, it has been found that such deposits are hard enough to scratch steel of as high as 670 Brinnel hardness. This means that deposits of this kind can cause wear of piston rings and cylinder liners if lodged in ports or ring grooves.

Lubricating oil also plays a part in formation of objectionable engine deposits. Generally speaking, it is less of a factor than the fuel except where good quality fuel is used and combustion is relatively complete. Notwithstanding, deposit type and quantity is affected by the type of oil used for cylinder lubrication. All things being equal less deposits and those of a soft and fluffy nature are formed with straight mineral naphthene base oils.

More deposits, hard and flinty, are formed with straight mineral paraffin oils. While there are cases where additive oils have effected some reduction in engine deposits, such oils have by no means been a cure-all for this problem.

The part that oil plays in the formation of objectionable oil deposits is directly related to the amount of oil delivered by cylinder lubricators to cylinders. To minimize port, ring groove and combustion chamber deposits, lubricators should be set to provide no more than the necessary amount of oil to prevent undue wear of piston rings and cylinders. What this quantity of oil should be is not an easy question to answer and, therefore, it is understandable that sensible practice is to set cylinder lubricators on the conservative side.

After all, it is considerably less expensive to clean out engine deposits periodically than it is to renew piston rings and cylinder liners more often than is absolutely necessary.

Unfortunately, this means in many cases, that more oil is delivered to cylinders than piston rings can handle. The amount of oil beyond that required for satisfactory lubrication has to do something. Accordingly, it stays in ring grooves, passes into the combustion chamber, is blown back through intake ports or out through exhaust ports. At any of these locations there is no further impetus to move the oil so it settles down and stews from the temperature effects of combustion. No oil has yet been developed which can withstand oxidation or decomposition under such conditions.

Elimination of objectionable deposits in large engines particularly those burning heavy residual fuels is a problem which may never be completely solved. Improvements in lucricating oils will help some and better conditions for combustion will help even more. The problem requires continued cooperation of engine builders and oil suppliers for the best interest of operators.

Engine Wear

While difficult to prove statistically, it is probable that wear, i.e., piston ring and cylinder liner wear, in large engines is caused more by corrosion than erosion or abrasion. As the term implies wear due to corrosion means chemical attack of piston rings and cylinder liner surfaces by vapors or acids of one type or another.

These corrosive materials form from products of fuel combustion some of which do not have an opportunity to exhaust from the confines of cylinders. The quantities and types of corrosive vapors and acids, mostly the latter because of the condensing effect following the power stroke, produced in the combustion chamber are dependent upon the following factors:

1. Fuel quality.
2. Completeness of combustion.
3. Jacket cooling temperature.
4. Exhaust back pressure.
5. Lubricating oil quality.

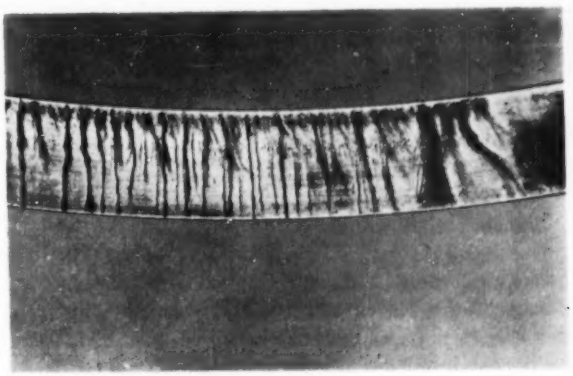


Fig. 5 Corroded piston ring.

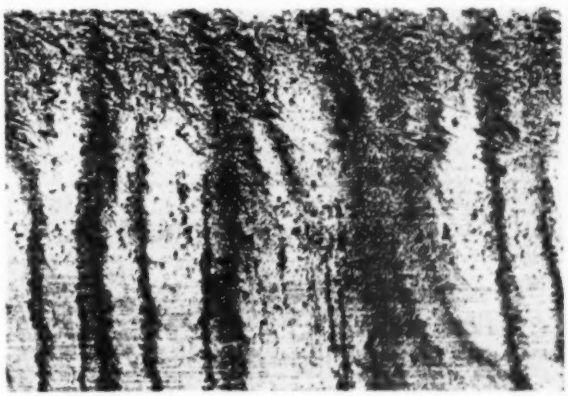


Fig. 6 Magnification of corroded piston ring surface as shown in Fig. 5.

For the most part fuel quality and completeness of combustion go hand in hand. Volatility is an important controlling feature, i.e., it is much easier to completely burn gaseous fuels than it is heavy residual oils. Fuel contaminants such as sulfur and nitrogen compounds also can form corrosive materials during combustion, particularly in the presence of water vapor. Figures 5 and 6 illustrate an example of chemical attack on piston rings caused by corrosive products of combustion. The ash ingredients, such as sodium, vanadium, iron, etc., in residual fuels are likewise a source of potentially corrosive materials.

Maintaining jacket cooling temperatures sufficiently high to prevent condensation of corrosive combustion products on cylinder walls will reduce this type of wear. Likewise being sure that exhaust back pressure is as low as practicable will permit combustion gases to be exhausted without too much interference.

The type of lubricating oil used can influence piston ring and cylinder liner wear due to corrosion. The more highly fortified lubricating oils, such as those complying with Supplement I and Series II requirements, have helped to minimize the effects of sulfur corrosion in engines of certain design. This is one of the reasons why these oils were developed and made available. How well such oils will combat the effects of corrosion resulting from the use of heavy residual fuels has yet to be clarified.

As already indicated ring and cylinder wear is not all due to corrosion. Abrasion and erosion also play a part and both are influenced by many of the same factors that affect corrosive wear including:

1. Air cleanliness.
2. Fuel quality.
3. Combustion chamber deposits.
4. Jacket cooling temperatures.
5. Exhaust back pressure.
6. Lubricating oil quality.

Needless to say it is important to properly filter the intake air to prevent abrasive contaminants from entering the combustion chamber. The same holds true with fuels, particularly those of the heavy residual type, which generally contain water and other contaminants not conducive to good injector lubrication.

The parts played by fuel and lubricating oil quality regarding the formation of combustion chamber deposits and their effects upon ring and cylinder wear have already been covered in the section on *Engine Deposits*. More can be said about lubricating oil quality, however, as in some large engines, particularly of the two cycle variety, the type of oil used for cylinder lubrication has a direct bearing on ring and cylinder wear.

In such cases more wear is experienced with naphthene base oil than paraffin distillate oil of comparable grade. Table J presents cylinder wear figures for one large engine covering six months' full load operation, some of the cylinders having been lubricated with naphthene oil and the remainder by paraffin distillate oil. Note that cylinder wear with the naphthene oil was about one and one-half times as much as that encountered with the paraffin distillate oil. Just why paraffin oils should enable less wear to be encountered in some engines than naphthene oils is not clearly understood at the present time.

In all probability, the difference between the two is associated with differences in viscosity and volatility characteristics at temperatures existing on cylinder walls during combustion. Using additive oils for cylinder lubrication of large engines burning gas or distillate fuel does not, in general, lower ring and cylinder wear.

Jacket cooling temperature, in so far as it governs cylinder wall temperature, influences wear rate not only from the corrosion viewpoint but also from the consideration of formation of deposits in and about the combustion chamber. The higher it is possible to maintain jacket cooling temperatures, the better chance combustion has to be complete and therefore the less likelihood of wear-promoting products, corrosive and/or abrasive, remaining behind to cause trouble. In this connection vapor phase cooling (cooling by evaporation) has been introduced on some large engines as a possible means of more effectively controlling cylinder temperatures.

It has been reported that engines so equipped run cleaner without any modification in lubricating oil requirement. While this may be true in many instances, each case should be considered individually to be sure that the proper type and grade of oil is used for cylinder lubrication.

Conclusion

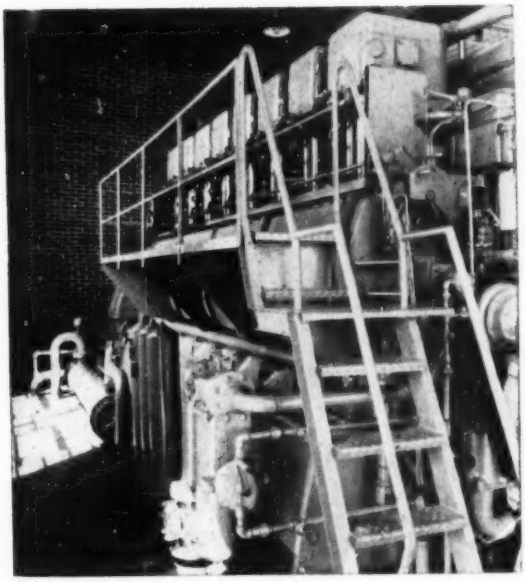
This discussion has covered some of the more important problems associated with the lubrication of large gas, dual-fuel and diesel engines. There are, of couse, others that have to be taken into consideration when engine builders, operators, and lubrication engineers get together to discuss the best ways to obtain most efficient engine operation. Mutual cooperation among the three groups not only will help to accomplish this objective but also will assist to overcome practical problems connected with engine performance.

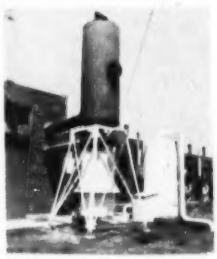
TABLE J
Cylinder Wear

Cylinder Oil	*Naphthene Oil*						*Paraffin Distillate Oil*				
Cylinder Number	1	2	3	4	5	Avg.	6	7	8	9	Avg.
Wear—Inches (1)	0.006	0.007	0.007	0.006	0.005	0.0062	0.005	0.004	0.003	0.005	0.0042
Wear—Inches (2)	0.004	0.006	0.004	0.005	0.006	0.005	0.005	0.003	0.004	0.003	0.0035
Overall Average						0.0056					0.0039

10,890 HP for Pipe Line Expansion

Dual-fuel engines as well as diesels are appearing in the pipe line industry in ever increasing numbers. Here are nine more engines for the Phillips pipe line expansion program.





Operating side view of one of nine 1210 hp supercharged and intercooled dual-fuel engines installed at the Sharpe, Kansas pumping station. Below is an exterior view showing exhaust silencer.

Supplying additional power for pumping 82,000 bbl of refined products a day over the new Phillips Products Pipe Line expansion, are nine Nordberg Duafuel diesel engines with a total rating of 10,890 hp. This line, which travels over 1000 mi from Phillips' Borger, Texas refinery to distribution points at Kansas City, Kansas; East St. Louis, Illinois; and East Chicago, Indiana now represents one of the most modern and efficient carriers in service today.

Nordberg engines were installed by Phillips to assure both flexibility in line operation, and maximum capacity from the 8-in to 12-in hydraulically balanced line. The units operate either separately, or in conjunction with older pumping units installed in alternate stations. In addition to Borger, the Nordberg engines are operating in stations at Spearman, Texas: Laverne, Oklahoma; Hardtner, Attica, Wichita, Sharpe, Paolá, and Bonita, Kansas. The Paola station is the division point for lines to Kansas City and St. Louis.

These engines are of the four-cycle type, both supercharged and intercooled, and have eight cylinders of 13-in bore and 16½-in stroke. They are each rated 1210 hp at 460 rpm. Each engine drives a United Iron Works six-stage centrifugal pump through a Westinghouse speed increaser with a ratio of 1:8.024 (460 to 3600 rpm).

One of the important features of this entire operation is the flexibility that has been assured through the installation of the units. Currently, the engines are operating on the dual-fuel principle, burning natural gas with a small quantity of pilot oil to initiate combustion. They are, however, convertible for operation on natural gas with spark ignition which allows the Phillips Company a great latitude of operation.

These engines incorporate an intercooler and the auxiliaries have been installed with sufficient capacity for converting the engines at a later date to *Supairthermal* operation. This will provide 30 per cent additional power when increased capacity is desired.

Cooling of the jacket water on the engines is accomplished by a pipe line heat exchanger using the products as a cooling medium. This exchanger, installed on the suction side of the pump, cools the water from the engine to 90°F, at which temperature it is pumped to the intercooler. This intercooler, of the two-pass type, then reduces the intake manifold air temperature from the turbocharger to 105°F, 35°F less than the normal for a low pressure supercharged engine. This permits the engine rating to be increased 10.5 per cent. Constant pressure is maintained by a surge tank located before the engine-driven water pump.

Speed is governed by a Woodward governor which is pneumatically controlled by air pressure from a controller actuated by suction pressure on the pipe line pump. With this system, a variable rate of flow is automatically controlled.

Equipment List

Engines	Nordberg Manufacturing Company
Governor	Woodward
Centrifugal Pipe Line Pumps	United Iron Works
Speed Increasers	Westinghouse
Lubrication System	
Oil Filters	Hilliard Corporation
Coolers	Ross Heat & Manufacturing Company
Pressure Gauges	Lonergan Company
Thermometer	Weston
Exhaust Silencer	Burgess Manning
Alarm System	Viking Instruments, Inc.
Exhaust Pyrometer	Alnor-Illinois Testing Laboratories, Inc.
Air Intake Filter	American Air Filter Company

Mobile Emergency Power

Here is a mobile Diesel-electric generating set ready to roll in the event of a fire, flood or other emergency.

Traveling over the nation's highways today, is the largest mobile emergency power unit developed. Mounted in a van-type trailer, the unit consists of a 500 hp diesel engine driving a 315 kw generator.

Designed as a service to the public the self-contained unit can provide mobile emergency power at any point a large tractor-trailer can go. It has been developed by the Caterpillar Tractor Company mainly as the result of frequent nation-wide calls on the company for loans of equipment in the wake of storms, floods and other emergencies.

In the event of power failure, creating the need for temporary electrical service in hospitals or to aid civil defense centers, Caterpillar has offered to lend this unit to any community.

Housed in a 32 ft trailer, the entire unit with all accessories weighs approximately 28 ton, or about 9 ton per axle. This is well under the maximum weight limits for most states. Traveling over the roads at 60 mph, the mobile set can move at high speed to the scene of the disaster, and begin operation a short time after arrival.

To save minutes and in some cases hours in an emergency, a two-way four-frequency radio-telephone has been installed on the unit. This eliminates the time that the unit would ordinarily waste in standing-by waiting for directions. The operators can receive instructions while enroute and maintain contact with a central point of operations. This feature adds greatly to the speed and mobility of a unit of this type.

In an emergency, the unit may be contacted either through the Caterpillar Tractor Company's home office in Peoria, Ill. or by calling the unit direct ZA 2-5457.

Operation

Unit operation is controlled by a special switchgear mounted in a compact cubicle. The master switch through which the current to the site flows has an automatic cut-off as a safety measure.

Frequency is maintained at 60 cycles for all loads. This is done by use of a hydraulic-type isochronous governor. Voltmeters are dual-range and read either 2400 or 4160 volts.

In the event that the diesel engine runs out of fuel, the main circuit breaker is automatically tripped by a reverse current relay. This prevents the motorizing of the generator if the unit is on the line.

Having its own switchgear allows the unit to be synchronized with another source of power or operate independently. Output is three-phase, 60-cycle at either 2400 or 4160 volts.

A drum mounted beneath the trailer carries 150 ft of special lead-in cable, which can be doubled or tripled in length by the use of auxiliary cables. The cables can be connected to any standard power line of 4160 or 2400 volts.

To facilitate voltage changes, special bus straps are used. This eliminates the disconnecting and retaping of leads. When voltages other than 2400 or 4160 are encountered, transformers must be used.

A 12 cyl Caterpillar diesel engine is used as the prime mover for the set. Its 500 hp is developed at the governed speed of 1200 rpm.

To start the engine, an air motor employing a vane-type turbine is used. Starting air is supplied to the turbine from a storage tank at a pressure of 100 psi.

For handling fuel oil, an engine driven fuel transfer pump is employed with a maximum suction lift of 12 ft. The unit's fuel tank has a capacity of 260 gal and can be refilled without stopping the engine.

When operating at full load, (315 kw) the engine burns about 25 gal of ordinary furnace oil per hour. For a 24 hr period of operation at full load, the diesel requires 11½ barrels of fuel oil. A wide range of fuel oils can be used to operate the engine, making it possible to use existing supplies of fuel on hand in different locales.

The coolant capacity for the engine and its large radiator is 16.5 gal. The radiator is mounted at the rear of the trailer for cooling. Air is drawn through the radiator at the rate of about 2½ tons per hr by a giant fan.

To reduce engine noises to a minimum, two residential-type mufflers are used. Exhaust gases pass through these and out through two pipes to the rear of the trailer.

Adequate space has been provided in the trailer to house all accessories necessary to the operation of the unit. Providing the crew have received complete instructions over the radio-telephone prior to arrival, the unit can be in operation and furnishing power within 15 min after arrival.

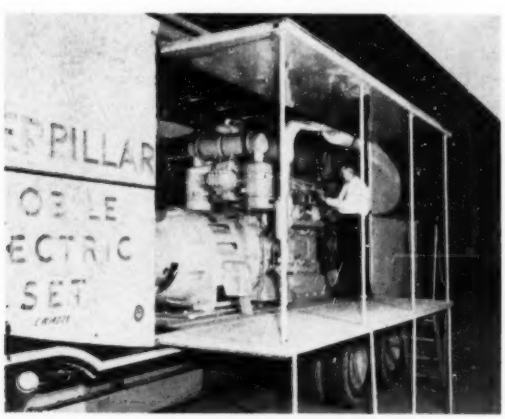
This unit or one of the same capacity can supply sufficient power to operate a 20,000 instrument telephone exchange, a 50,000 watt radio station transmitter, or light 3000 100 watt light bulbs.

Development

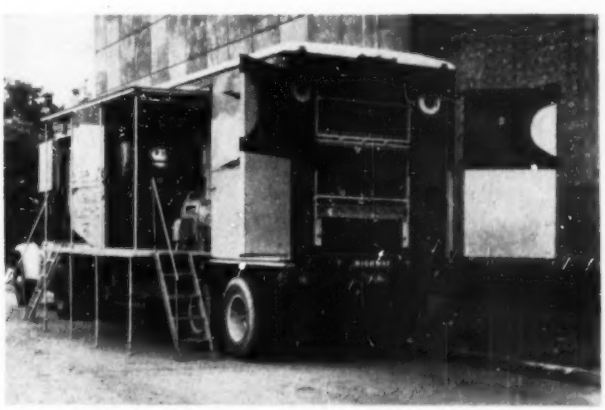
Although developed by Caterpillar, many of the parts which comprise the mobile diesel-electric set were supplied by other industries. The engine is a 12-cyl four-cycle valve-in-head "Cat" product. The General Electric Company supplied the generator, which is of the direct connected rotating field type. The control cubicle and switchgear were manufactured by the Esco Company. For hauling the trailer, the Mack Truck Company supplied the model A50 tractor.

The trailer which houses the self-contained unit and its accessories was built by the Highway Trailer Company. The Western Electric Company manufactured the four-frequency radio-telephone which was installed by the Illinois Bell Telephone Company of Peoria, Ill.

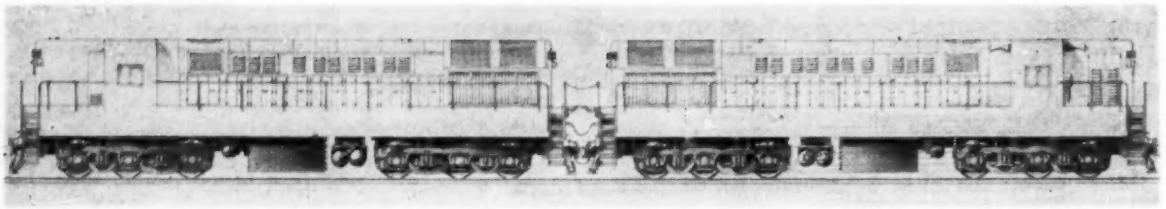
Civil defense units and other disaster relief organizations would do well to review the possibilities of a unit of this type. In the event of a national emergency, many such units would be needed to supply power for hospitals, etc.



This 315 kw generator set is the same unit used in tugs, diesel-electric locomotives and rock crushers.



With the side panels open, additional working space is available. Supporting members for these panels fit into a special rack in front of the radiator when in transit.



Introducing the highest capacity single-engine diesel-electric locomotive unit, designed for the broadest possible application.

F-M's "Train Master"

DEVELOPMENT of this new and powerful locomotive unit is the outgrowth of two concepts of which Fairbanks-Morse is firmly convinced. First, they believe that the major trunk line railroads, representing the bulk of the remaining market for conversion from steam to diesel, are seeking a practical motive power unit embodying high engine horsepower and high pulling capacity.

Secondly, the company is convinced that the present stage of dieselization on American railroads precludes the purchase of limited-purpose locomotives. Remaining requirements accentuate the need for units with the broadest possible application. The "Train Master" was designed with these concepts foremost in mind.

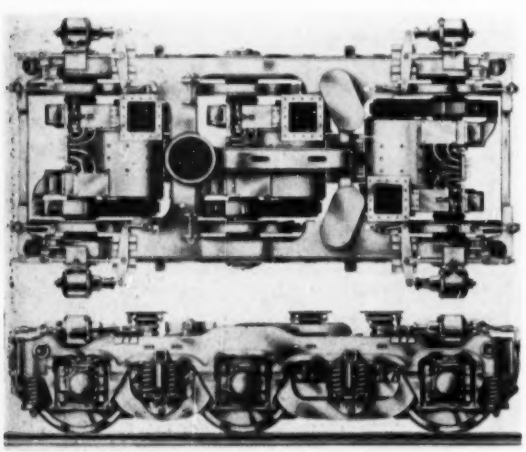
It was felt that there were definite advantages in reducing the number of units required to assemble locomotives of large horsepower. Preliminary investigations produced a marked affirmative reaction. Thus, it is now possible to assemble a 4800-hp locomotive having two units compared with the three or more formerly required.

Moreover, there was indication that there were traffic loads for which a conventional 1600-hp unit was not quite adequate whereas two such units constituted an over investment in motive power to do the job. Fairbanks-Morse was in a position to supply the necessary power with a single engine using their 12-cyl. O.P. engine rated 2400 hp.

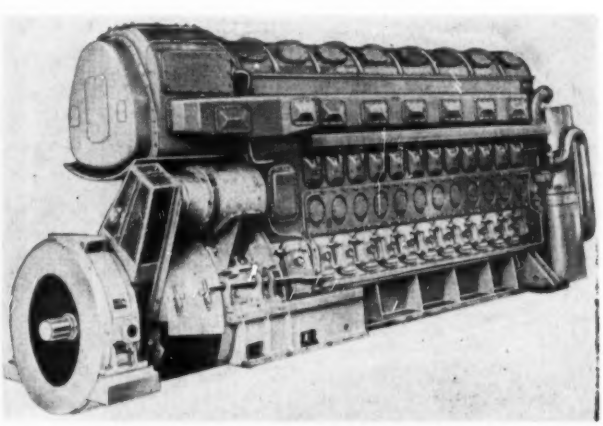
It was felt that the new locomotive could not be readily developed as a simple modification of the existing "C-Line" 2400-hp freight locomotive. Indications from the railroads had shown the need for a more universal type of unit to handle all sorts of assignments.

General Appearance and Use

When designing the unit, a hood-type superstructure was selected for very good reasons. It provides good accessibility for easier maintenance, better all-around visibility, and a high degree of versatility. Inclusion of switchman's footboards, hand railings, grab irons, etc., makes for convenience in those services requiring frequent switching.



A view from the top and side of F-M's new Tri-Mount locomotive truck.



Above is the 12-cyl opposed piston engine which supplies the 2400 hp developed by the "Train Master". Engine and generator are mounted on a common sub base.

A big factor on certain types of runs is the ability to operate in either direction without turning. The short hood will generally be the forward end of the locomotive but, as an option, this can be reversed. Also, two cabs can be provided for operation in either direction from the right side in high traffic density areas.

In addition to being adaptable for heavy duty switching and freight service, the new unit can also be used for passenger service, either as a full time assignment or as part-time duty. The largest steam generator available for locomotive service, a Vapor Heating type O.K. 4740 with an evaporating capacity of 4500 lb of steam per hr, can be installed at the short hood end and is sufficient to heat a 15-car train with temperatures as low as 0°F. Feedwater supply is adequate for 4-hr operation at full capacity.

Thus, the new locomotive has wide operational flexibility plus the advantage of high horsepower in a single unit.

Power Plant

As mentioned, the single engine producing 2400 hp at 850 rpm is F-M's 12-cyl opposed piston engine. This is the same engine used, with varying numbers of cylinders, in their "C-Line" units. It is the most powerful engine currently in locomotive use.

Since the engine is now in use on many railroads, parts and maintenance problems are minimized. Also, the cooling, lubricating, and fuel systems are the same as used on other F-M models and thus the maximum interchangeability of parts between the "Train-Master" and other F-M units is possible.

TRAIN MASTER SPECIFICATIONS

MODEL	H24-66, 2400-hp Road Locomotive	
TYPE	Whyte Symbol	0-6-6-0
	AAR	C-C
EQUIPMENT	1—12-cyl Fairbanks-Morse Opposed-Piston Model 38D 8⅛	
	6-Heavy Duty Traction Motors	
	4500 lb/hr Capacity Steam Generator	
	Roller Bearings 6½" x 12"	
MAJOR DIMENSIONS	Overall length inside knuckles	66'0"
	Overall width	10'3¼"
	Overall height above rail	15'0"
	Width of power plant compartments	7'0"
	Wheelbase each truck	13'0"
	Wheelbase total locomotive	49'4"
	Distance between truck centers	41'6"
	Wheel diameter	42"
SUPPLIES	Fuel oil	1800 gal
	Lubricating oil	385 gal
	Engine cooling water	250 gal
	Train heating water	2400 gal
	Sand	48 cu ft
WEIGHTS	Total fully loaded	375,000 lb
	Total on drivers	375,000 lb
	Per axle	62,500 lb
PERFORMANCE	Starting tractive effort at 30% adhesion	112,500 lb.
	Continuous Tractive Effort	Lb
	Gear Ratio 68:15 (Max. Speed 65 mph)	78,750
	Gear Ratio 63:15 (Max. Speed 70 mph)	72,900
	Gear Ratio 62:15 (Max. Speed 80 mph)	63,300
	Dynamic Brake Capacity at Rail	3,000 hp
	Minimum radius of curvature	212' (27°)
	Minimum radius of curvature, locomotive coupled to AAR 40'6" freight car	273' (21°)

Transmission

Main transmission components are taken directly from the 2400-hp F-M road locomotive models. Two additional traction motors are used, giving a total of six driving axles. The maximum continuous tractive effort rating is 78,750 lb, the highest available in any single diesel locomotive unit. Three optional gear ratios (see Table) permit selection of the most suitable range between maximum continuous tractive effort and maximum speed.

Running Gear

The two 6-wheel, 3-motor trucks incorporate the best of proved components. The combined maximum tractive effort, high braking power and three-way (Tri-Mount) ride control with simplicity of construction, a minimum of moving parts and maximum accessibility. They have undergone a severe apprenticeship in general heavy duty service on all types of motive power and rolling stock.

Wheel and truck spacing results in relatively low Cooper's bridge loading factors for the axle loading and total weight involved. Rail stressing due to vertical loads is exceptionally moderate. Compared with a typical 1600-hp 4-axle unit, having the same weight per axle, only 89 per cent as much bending moment is imposed on the rails with a given road bed condition.

Dynamic Braking

Every effort was made to utilize fully the capacity and characteristics of the traction motors for dynamic braking. About 3000 hp, 50 per cent more than the rail-horsepower when motoring, is dissipated over the braking speed range by each unit.

This high dynamic brake capacity means substantially increased control of heavy trains going down grade. Safe control at higher downgrade speeds is an important factor in moving today's high-speed, tightly scheduled freight trains.

What Can It Do?

High horsepower in itself is not enough; the measure of successful design is how effectively this power is put to work. The new locomotive unit has the train handling capacity of one and one-half 1600-hp "C-Line" units, or 1600-hp, 4-axle, 4 motor road switching All-Purpose locomotives.

The high tractive effort capacity of this locomotive unit means that it can handle a 50 per cent or more longer train on a given grade at the same speed when compared to a 1600-hp 4-motor locomotive unit. On heavy mine drags or similar jobs, its higher horsepower means that it will be available to make a larger number of runs per locomotive day since it can handle the jobs with substantially less elapsed time when compared with other

(*Continued on page 83*)

Cast Iron That Bends

Not only does it bend, but it twists.

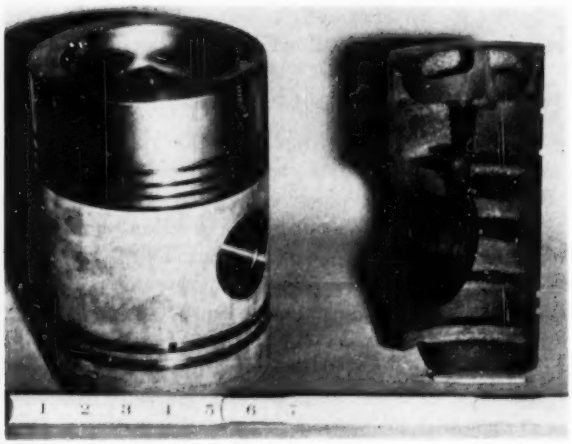


Photo courtesy State Foundry and Machine

Here, a piston cast of ductile iron for use in a diesel engine. Cutaway view shows construction more clearly.

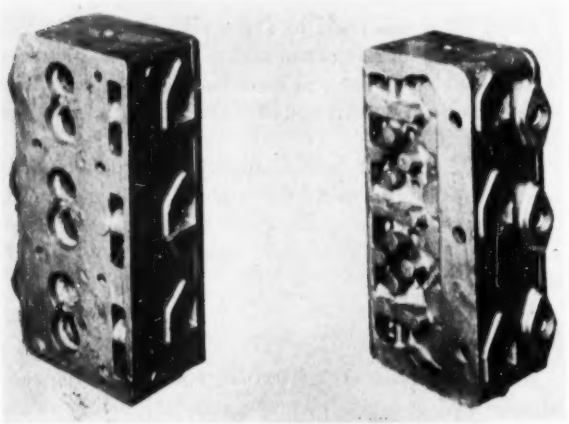


Photo courtesy Grede Foundries

These castings of diesel engine heads illustrate another of the many applications for ductile iron.

International Nickel's new ductile iron "... bridges the gap between ordinary gray iron and cast steel ..."

Cast iron is one of the most useful of metals. Low cost, generally good castability, relatively good machinability, and excellent wear qualities are some major factors that have made it invaluable for engine components. On the other hand, its low physical strength when compared with steels and its brittleness have been properties to overcome by generally heavier design, or in extreme cases, by substitution of stronger but perhaps less suitable materials.

Recently, the International Nickel Company made public details of their development which bridges the gap between ordinary gray iron castings and cast steel—ductile iron. Developed after considerable research at their Bayonne Research Laboratory and tested under actual foundry practices in the field, the patented process for making the ductile iron is now being used under license by some 190 companies, half in this country and the balance through the world.

What Is It?

Ductile iron is a high-carbon ferrous product containing graphite in the form of spheroids. This is in contrast to gray iron in which flakes of graphite form a series of discontinuities in the metallic matrix, creating a relatively weak and brittle material. It has also been called spheroidal graphite iron and nodular iron. The latter, however, could also apply to malleable iron in which the graphite appears as "nodules", so spheroidal graphite iron or the name, ductile iron, are the most descriptive.

International Nickel conducted experiments just prior to World War II aimed at stretching available supplies of metals without any sacrifice in quality. In the course

TABLE I—Representative Mechanical Properties of Commercial Heats of Ductile Iron

Tensile Strength, psi	Yield Strength, psi	Elongation, per cent	Bhn	Usual Condition
95/105000	70/75000	2.5/5.5	225/265	As-cast
85/95000	65/70000	5.5/10.0	195/225	As-cast
65/75000	50/60000	17.0/23.0	140/180	Annealed
85/95000	65/75000	1.0/3.0	230/290	As-cast

of these it was discovered that magnesium could convert the graphite in ferrous metals into spheroidal form. This was the start of ductile iron.

The objective was to find a method of retaining approximately one pound of magnesium in one ton of iron. The technical difficulties involved were solved. Thus, the introduction of about 0.05 per cent magnesium into iron produced ductile iron and opened up a tremendous field of possibilities for increased use of iron castings.

What Are Its Characteristics?

Castability—An important property of ductile iron is its unusual fluidity in its molten state and its ability to fill intricate molds. In this, it surpasses both gray iron and aluminum. This castability, combined with its physical properties, makes it highly suitable for pressure castings. Also, in this regard, ductile iron does not appear to be susceptible to hot tearing (excessive contraction strains).

Because it can be produced in a cupola and in view of its fluidity, the foundry pouring ductile iron has wide flexibility with respect to the size, intricacy, and number of castings that can be produced at one time. Illustrating this, castings have been made ranging from a few ounces with light sections (down to 0.10-in thick) to 50-ton anvil blocks with 48-in sections.

Tensile Properties—Most of the current ductile iron production in this country conforms to the properties shown in Table I: Structure of the first as-cast grade is substantially pearlitic, giving maximum strength, while the second, lower in manganese and nickel content, has a ferritic-pearlitic structure with lower strength and greater ductility. Both, when annealed (third line), produce ferritic structures. The third grade is higher in phosphorus and while giving high strength and stiffness, is not so tough or resistant to shock as the first two grades.

Ductile iron responds to heat treatment like steel. Not particularly susceptible to cracking, it can be quenched in either oil or water. Tensile strengths in the order of 150,000-180,000 psi are readily obtained and they have gone as high as 230,000 psi. Variation in composition and the effects of alloying agents permit flexibility so as to emphasize the particular property desired.

Wear Resistance—In a number of applications requiring mechanical wear resistance, performance of ductile iron has been considerably better than anticipated from laboratory results. These indicated that in an unlubricated condition, resistance to galling and scoring would be equivalent to the best grades of gray iron.

One typical example in actual service involves bevel gears in a pump handling crude petroleum products. Gray iron gears showed excessive pitting and wear at the pitch line in 300 hr of service. Ductile iron gears ran over 1000 hr with no deterioration or pitting. Many similar experiences have been encountered and it is notable that ductile iron is replacing a number of bronze parts in applications concerning wear.

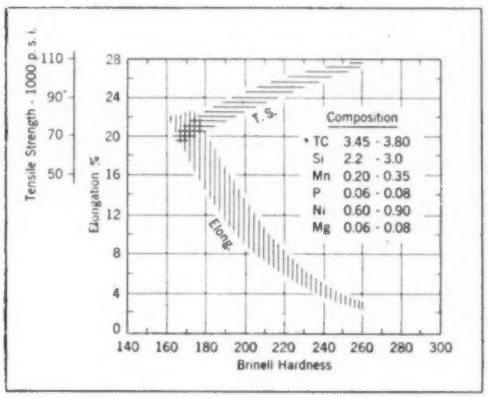
Ductile iron can be readily hardened (flame or induction) to 550-600 Brin. and thus is adaptable for such uses as cams, sprockets, gears, etc. Under such conditions, wear resistance is reportedly truly phenomenal.

Heat and Oxidation Resistance—Considering the microstructure of the ductile iron, it is to be expected that its heat and oxidation resistance at elevated temperatures would be superior to that of gray iron. This has been confirmed both in the laboratory and in the field. This characteristic is very important in such engine components as cylinder heads.

Fatigue Resistance—Extensive tests have shown ductile iron to have the fatigue resistance of ordinary grades of steel, in both the notched and unnotched condition. This property, combined with its wear resistance and the relatively high constant modulus of elasticity of 25 million psi (29 million for steel), makes it a material suitable for engine components subjected to alternating stresses and bearing wear.

Resistance to Shock Loads—On the basis that an impact load causing a small amount of deformation is governed essentially by the yield strength, ductile iron will have the same shock resistance as ordinary steels having the

(*Continued on Page* 87)



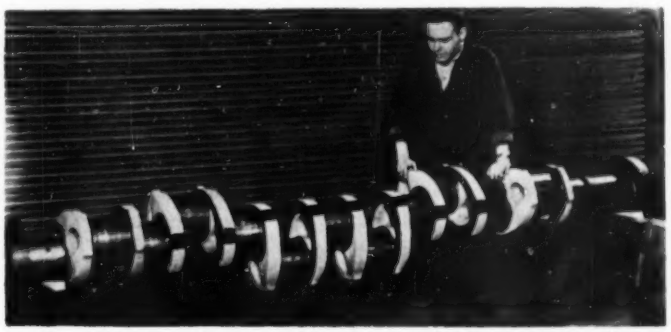


Photo courtesy Cooper-Bessemer

Above, a crankshaft of ductile iron for a diesel engine.
At left, relation between tensile strength, elongation, and hardness of ductile iron.

Straight from the Tool Box

This is YOUR Department. Pass along your ideas to the other fellow. Send items to the Editor, preferably with a picture or sketch. Contributors will receive $10.00 for each item upon publication.

Slipup Causes Air Box Fire

F. C. Lougheed, Victoria, B. C.—Adverse sea conditions necessitated frequent "rounds" on my twin-engine, 1400-hp marine installation. I logged satisfactory conditions and not five minutes later, noted a drop in revs in the starboard engine. At the same time I noticed smoke coming from the vent of the scraper ring sludge drain tank.

The engine was immediately slowed and the exhaust gas temperature checked. Pyrometer readings for cylinders Nos. 4, 5, and 6 showed 1000°F. I then noted that the scavenging air trunk thermometer was above its top limit of 200°F. I suspected, and rightly so, a fire in the air trunk.

I took up a CO_2 fire extinguisher and exhausted the charge into the scavenging pump suction. The engine stopped immediately but I kept the piston cooling oil pump and the jacket water pump running to carry away the heat. About an hour later I was satisfied that all temperatures were normal. There were no visible indications of oil or water leaks resulting from the high temperatures, so I started the engine and ran at reduced revolutions for the remainder of the voyage.

After the excitement was over, I had time to ask myself, "What happened?". Finally, I blamed the incident on an oversight that took place at the Fueling Depot. At that time I had had both the main engine sumps and the scavenging air trunks flushed out. Fuel oil was used as a solvent. Instructions were that there should be a thorough "wipe-down" before the doors were fitted in place. That was the oversight; I didn't inspect it personally. All the fuel oil was not drained or washed out and a quantity was left in the starboard engine air trunk. This was the oil that caught fire when the engines came up to running temperature.

I feel that it is a design defect in the engine that no provision is made such that I could have opened up the scavenging air trunk for inspection to determine if the fire was there and if so, its magnitude.

This is an interesting little yarn for a number of reasons. Air box fires are not too common, particularly since a number are provided with drains. Stack fires are much more common. Mr. Lougheed's actions in the emergency were admirable. Prompt and correct action saved what could have been a major catastrophe. The CO_2 should not harm the engine as it has often been used for air starting when the air pressure was down.

Some of the later reasoning requires comment. The fuel in the air box was undoubtedly responsible, but how and why? All that we can figure out with the information at hand is that the fuel oil carried over into the cylinders, that later showed the high pyrometer temperatures, and that this fuel plus that injected raised the temperatures and pressures to the point that blow-down was not complete when the intake ports opened. High temperature gases and/or incandescent particles entered the air box and set the fuel oil afire. (Anybody have any ideas?)

As to the comment concerning inspection doors—Oh, Boy! Mr. Lougheed, don't ever—ever—open up an inspection door on an overheated engine that is giving signs of trouble. Letting air in to mix with oil vapors can lead to severe explosions. The manufacturers know what they are doing.—Editor.

Repairing Leaky Gaskets

John C. Hellner, Tulsa, Okla.—Lube oil leaks sometimes occur at "hard to get at" places such as the end-cover on a generator unit. It would be necessary to remove the flywheel, stub-shaft and generator to replace the leaking gasket.

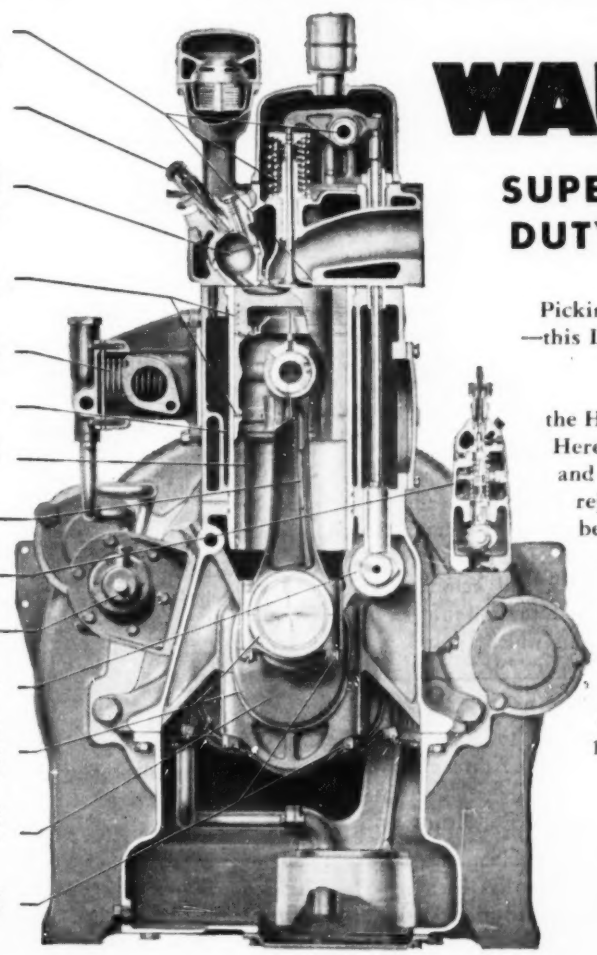
Such leaks can be repaired by obtaining, from any drugstore, small amounts of litharge and glycerine. These two ingredients are mixed together to form a paste of such consistency that it can be worked into any small openings. It will set up very quickly, will be hard, and make an effective seal.

Just recently we had a gasket blow out on the end-cover of a large compressor engine, allowing the oil in the sump to run out. Instead of a good day's work, the leak was repaired and the engine was back operating within an hour, using the above method of repair.

A handy repair method for many plant jobs.—Editor.

PICKING PEELERS *out of* PONDS

Link-Belt Speeder, owned by Rehrig Bros. Logging Co., Eureka, California, has a **6-WAKD Waukesha Diesel**


Dual springs, long guides. Pressure-oiled rockers. Stellite-faced valves and seats.
American Bosch single-hole pintle nozzles.
Clean-burning combustion chamber removes from outside. Upper half water cooled; lower half air insulated to concentrate heat at throat.
Four non-stick "keystone" rings, top ring chrome-plated. Two flat oil rings.
Built-in oil cooler increases oil and engine life.
Full length water jackets.
Hardened renewable cylinder sleeves test 375-425 Brinell.
Rifle-drilled rods. Oil jets cool pistons.
American Bosch fuel injection pump.
High-capacity outside oil pump.
Hardened camshaft, single forging.
Hardened main and rod journals. Steel-back, triple-element precision bearings, pressure oiled.
Drop-forged hardened crankshaft. High-speed counterweights not shown.
Alloy-steel heat-treated rod and main bearing bolts.

WAUKESHA

SUPER DUTY *Diesel*

Picking up peelers like they were toothpicks —this Link-Belt Speeder does its daily dozens with a Diesel—a Waukesha Diesel! It's working at the boom pond of the Humboldt Plywood Corp., Arcata, Calif. Here, after logs are separated and graded and peeler blocks cut off, it picks up the rejected peelers, loads 'em on trucks to be hauled to a sawmill for manufacture into dimension lumber. The operator can pick 'em up, swing 'em round, lay 'em down—just like that. He puts on the power, *this* Diesel does it. It's Waukesha's *fast recovery*. Model 6-WAKD shown has six cylinders, 6¼-in. bore x 6½-in. stroke, 1179 cu. in. displacement, 224 peak hp. Get Bulletin 1415.

WAUKESHA MOTOR COMPANY
WAUKESHA, WISCONSIN
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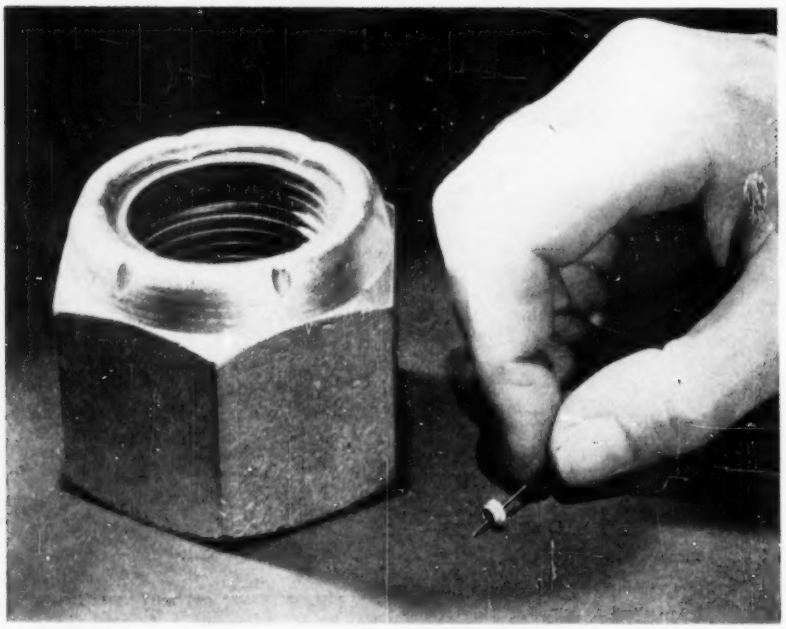
195

New Products



Miniature Elastic Stop Nuts

A new line of miniature hexagonal stop nuts, as small as 0.109 in across flats, has been introduced by Elastic Stop Nut Corporation of America. The tiny hexagonal nut, with nylon insert, is shown here suspended on needle point. It compares in size with the giant nut at left which measures 2⅜ in high, 2¾ in across flats, and is used on big diesel engines, locomotives and drilling equipment.

Believed to be the first integral locking collar-type of self-locking nut manufactured to such minute dimensions, the nut is expected to find use in specialized applications, particularly in the electronics and instrumentation fields. They make possible precise adjustments whether the nut is tightened against a seating surface or simply located at any predetermined point on a threaded member.

The nylon locking insert maintains a constant and highly reuseable grip on the screw threads, unaffected by vibration. The simplicity of this one-piece approach is a great production advantage over earlier locking methods such as double nuts, soldering, lock washers, or peening.

The nut is already being tested by a number of manufacturers for such products as servo-mechanisms, walkie-talkies, and autopilots. They are expected to find use in the electronic brains which control guided missiles.

New Annin Valve

A new "Wee Willie" high pressure, low flow control valve has recently been introduced by the Annin Co. of Los Angeles, Cal. Pneumatically controlled, the valve is specifically adapted to pilot plant operation.

Standard models are available with working pressure ranges of 10,000 psi and 30,000 psi, with special assemblies up to 50,000 psi. Sizes range from ⅛ in through ½ in.

Pressure Regulator and Filter

A combination pressure regulator and filter has been added to its line of standard products by the industrial division of Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44, Pa. The new device provides a single, compact unit that contains the functions of a reducing-relief valve and a filtering arrangement for line service.

Line pressures up to 150 psi can be reduced and maintained at any regulated output pressure from 0 to 35 psi without appreciable drift or air consumption. In addition, the filter and dripwell, accessible for easy removal and servicing, assures a clean supply of air.

Cooling System Filter

Reduction of wet-sleeve pitting in industrial diesel cooling systems by as much as 70 per cent through application of the Perry cooling system filter, is claimed by the manufacturer, the Spark-O-Liner Corp., Minneapolis, Minn.

Pitting, caused by galvanic action in minute areas not adequately protected by rust inhibitor, is eliminated through a cathodic current generated by the filter. This current, while small, is sufficient to induce the forces of corrosion to attack corrosion-resister plates in the filter, which are more vulnerable than metals in the cooling system.

Rusting, pitting, hardness deposits, acid or alkaline conditions, and insoluble impurities are controlled by a combination of mechanical filtration, chemical additives, and electrochemical protection. A synthetic zeolite exchange bed removes mineral hardness and dissolves previously deposited scale; insoluble particles are filtered out of the circulating coolant.

Acid or alkaline conditions are neutralized by a buffeting agent added to coolant during filtration from the chemically activated element. Both chemical and electro-chemical methods are used to combat the more complex problem of corrosion.

In a single unit installation, the filter is attached to the engine with

by-pass hose connections similar to a water heater. The coolant is chemically treated during filtration and returned to the suction side of the water pump.

New Pipe Insulation

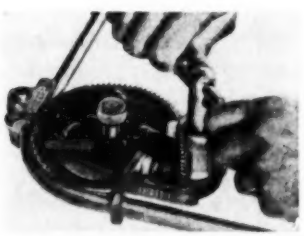
The anti-corrosion qualities of polyvinyl chloride and ease of application of a pressure-sensitive tape have been combined in two new corrosion resistant tapes manufactured exclusively for pipe-wrapping by Minnesota Mining and Manufacturing Co., 900 Fauquier St., St. Paul. Minn. Designated "Scotchrap" pipe insulation No. 50 and 51, they are packaged and sold by the square.

Use of the tapes eliminates the need for tar pots and cumbersome equipment, it is claimed, and provides an economical, pinhole-free cold coating that can be applied in a single step by regular pipeline crews. They are advantageous for short jobs or inaccessible locations, since application is made in the field.

The tapes also provide good dielectric qualities (10,000 to 22,500 v), are non-absorbent, abrasion resistant, and adaptable to automatic and hand operated pipe-wrapping equipment.

New Gear-Type Tube Bender

A new universal gear-type tube bender, which will bend any type of tubing, including hard drawn copper and hard temper steel, has been announced by the Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.



The bender can be positioned on a tube at any point where a bend is desired, even when one end of the tube is connected. It can be held by hand, clamped in a vise, or bolted to a bench. Benders are available for tubing from 3/8 in to 1 1/8 in OD.

Heavy Duty Portable Nibbler

A new portable nibbler that cuts through 14-gauge stainless steel, C.R. steel, galvanized iron, and softer materials without distortion on either side has been developed by Fenway Machine Sales Co., Inc., 20 So. 15 St., Philadelphia 2, Pa. The instrument also cuts holes in tubes and ducts without damaging the original contour. It can be mounted in a vice for bench operation or used as a hand tool.

The nibbler weighs 7 1/2 lb, is 10-in long and comes equipped with a Universal motor, 3 conductor, 8-ft long rubber cord and connections. Minimum cutting radius is 7/8 in. Antifriction bearings are on all rotating parts with gears precision hardened. It is guaranteed against defects.

Electric Standby Heater

The Vapor Heating Corp., 80 E. Jackson Blvd., Chicago 4, Ill., has developed two electric immersion

simple as A B C to prevent ENGINE DAMAGE

Overheated cooling water or oil pressure failure can attack any engine . . . *even your own.* And when that happens, it's liable to cause major engine damage.

But here's how such damage *can be prevented!* Simply equip your engine with the PENN Safety Control. Then, at the first hint of engine overheating or oil pressure failure, the PENN control *automatically* sounds an alarm . . . flashes a warning light . . . or stops the engine operation. Thus you can investigate and correct the minor fault before damage occurs.

Learn more about this low-cost, positive protection for new or old engines. Write **Penn Controls, Inc., Goshen, Indiana.** Export Division: 13 E. 40th Street, New York 16, N. Y., U. S. A. In Canada: Penn Controls Limited, Toronto, Ontario.

Typical Functions of PENN Safety Controls

Diesel Applications. Sounds an alarm . . . closes magnetic fuel valve and sounds alarm . . . closes magnetic fuel valve only . . . closes magnetic fuel valve and opens pilot relay.

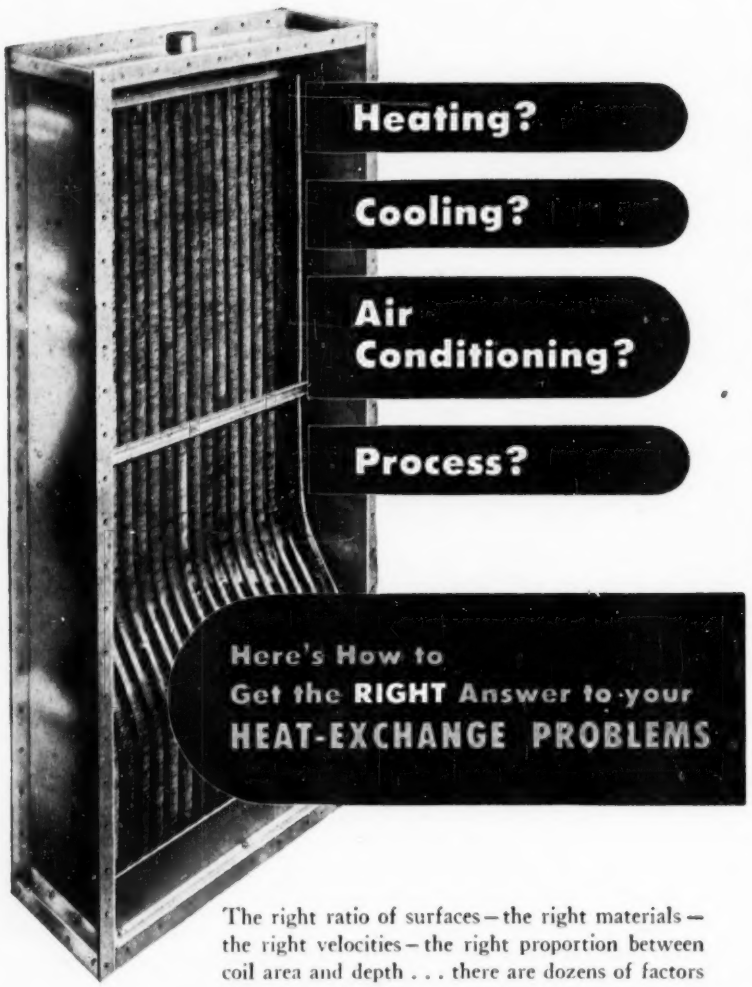
Battery Ignition Applications. Opens battery circuit and sounds an alarm . . . sounds an alarm only . . . opens battery circuit only.

Magneto Ignition Applications. Sounds an alarm only . . . grounds dual magneto . . . grounds magneto only . . . grounds magneto and sounds alarm or lights signal light.

Dual Ignition Applications. Opens battery circuit and grounds magneto.

PENN AUTOMATIC CONTROLS

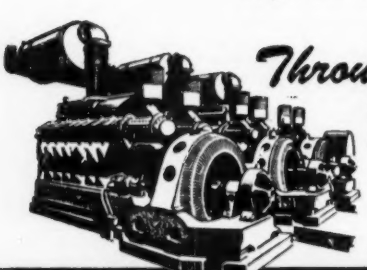
FOR HEATING, REFRIGERATION, AIR CONDITIONING, PUMPS, AIR COMPRESSORS, ENGINES, GAS RANGES



The right ratio of surfaces—the right materials—the right velocities—the right proportion between coil area and depth . . . there are dozens of factors that affect the efficiency, maintenance and service life of heat-exchange coils.

For best performance in your own application, the practical approach is to take full advantage of the unequalled engineering, research and design skill—the unequalled manufacturing and testing facilities—which Aerofin offers you.

To get the *right* answer—ask the Aerofin man.



Throughout the Power Industry—

Aerofin units do the job Better, Faster, Cheaper

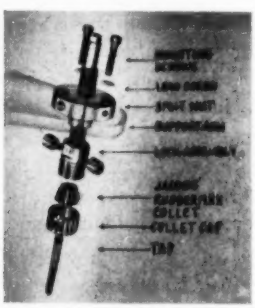
AEROFIN CORPORATION 410 South Geddes St. Syracuse 1, N. Y.

standby heaters to keep the engine coolant water warm in diesel-electric locomotives. Outside electric current is used.

If the heater does not work properly an alarm bell signals the yard attendant so that correction can be made before the engine cools down. The heater is a complete package requiring small floor space, with a 1/3 hp motor using 220/440 AC current. One size puts out 75,000 Btu per hr, while the other puts out 120,000 Btu per hr.

New Tapping Attachment

Auto-tap is the new name for a lead screw tapping attachment being produced by Automatic Methods, Inc., 42 Walnut St., Newark, N. J. The attachment has a variety of split nuts and matching lead screws that are available in different pitches.



The exploded view illustrates the construction of the operating part of this unit. The complete unit attaches to a standard drill press by means of the arm (partially shown in illustration), and the lead screw and nut through which it passes controls the drive of the tap. The unit is held in the chuck of a reversing head.

By use of the tap, the company states, no matter what pressure is applied, a perfect thread will result, the split nut and screw preventing uneven pressure being passed on to the thread.

New Camera Increases Scope Of Xerography Process

A new camera that reduces or enlarges an engineering drawing, chart, etc. by the xerography process directly on to an 8½- by 13-in xerox plate is announced by the Haloid Co., Rochester 3, N. Y.

The camera was developed to meet the demand for a method of reducing large drawings to this size. Before this, they were copied size for size and limited to 8½- by 11-in size originals. The new camera permits 50 per cent to 100 per cent size of copy reproductions.

New Loading Resistor

A new standardized loading resistor for load-testing the power plants of diesel-electric locomotives rated up to 2500 hp is available from the Westinghouse Electric Corp., Pittsburgh 30, Pa. The resistor is a self-contained, compact unit weighing 3500 lb.

Sections are connected through knife switches and bus bars that make possible 10 different series-parallel combinations to give 10 load points. Elements are mounted for maximum surface cooling and have slip-joint supports to allow expansion under load. Individual resistors can be replaced without disturbing adjacent elements. No external source of power is required since the blower motor is part of the resistor circuit.

New Traction Brush Grade For Diesel-Electrics

The National Carbon Co., a division of Union Carbide and Carbon Corp., 30 E. 42 St., New York 17, N. Y., announces a new traction motor brush grade for Electro-Motive Div. diesel-electric locomotives.

The DE-3 brush has been tested in freight and passenger service on seven Class I railroads covering a total of 7½ million miles. Greater strength, lower friction, and longer service life are claimed.

Poweractor Positioner

Accurate positioning of cylinder-operated devices is the function of the new Poweractor positioner, introduced by the Foxboro Co., Foxboro, Mass. Operating from a standard 3-15 psi pneumatic controller signal, it applies a high pressure, pneumatic differential across a cylinder piston, sufficient to produce the position demanded by the controller.

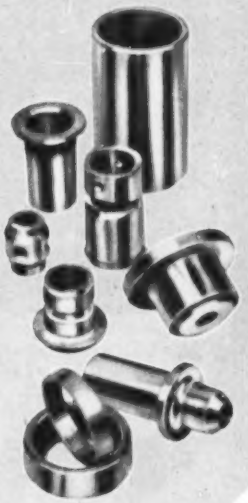
The instrument is a force balance

JOHNSON SLEEVE BEARINGS

Engineered for YOUR Application

Johnson Bronze engineering is far more than designing bearing types and shapes. It is based on thorough studies of your product, its service requirements and your methods of assembly. Johnson engineers start with complete information—load, speed, shock, operating temperatures, lubrication, corrosive conditions and other data. Design is often affected by installation and mounting methods. After this study they may recommend one of several types of sleeve bearings and the correct bearing alloy for your use. And they will design the bearing to your requirements, working closely with your engineers. If this kind of service will be valuable to you, write, wire or call for an appointment.

JOHNSON BRONZE COMPANY
520 South Mill St., New Castle, Pa.



Sleeve Bearing Headquarters Since 1901

JOHNSON JB BEARINGS
Sleeve-Type

Pumps

FOR

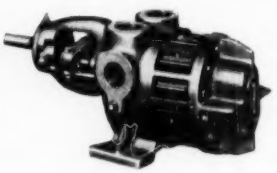
MANUFACTURING PETROLEUM, MARINE AND PROCESS INDUSTRIES

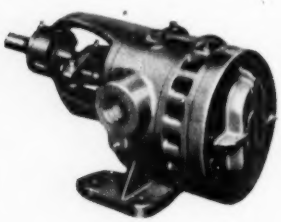
MODELS FROM 3/4 TO 300 G.P.M. — CAPACITIES TO 1000 P.S.I.

SPEEDS UP TO 1800 R.P.M. FOR PUMPING CLEAN LIQUIDS

SERIES F

Four-port design offers 8 optional piping arrangements. Equal size helical gears run in axial hydraulic balance. Standard or bronze fitted; packed box or mechanical seal. Up to 300 P.S.I.—1 to 300 G.P.M. for clean liquids.



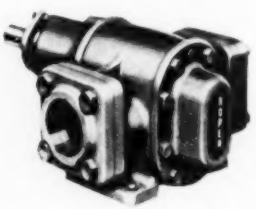


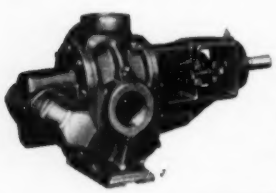
SERIES H

Widely used for hydraulic mechanisms and other applications where high pressures are required. Spur gears provide high volumetric efficiency. Packed box or mechanical seal. Pressures to 1000 P.S.I. — 5 to 75 G.P.M. sizes.

SERIES K

For hydraulic service, fuel transfer or fuel supply. Features helical gears and exclusive Venturi suction and discharge principle in 10 through 50 G.P.M. sizes. Packed box or mechanical seal. 150 P.S.I. — 3/4 to 50 G.P.M.





SERIES 3600

For general purpose work handling thin or thick liquids with suction lift up to 15 feet. Standard or bronze fitted; with or without built-in relief valve. Pressures to 60 P.S.I. — 40 to 300 G.P.M.

SEE OUR CATALOG IN SWEET'S

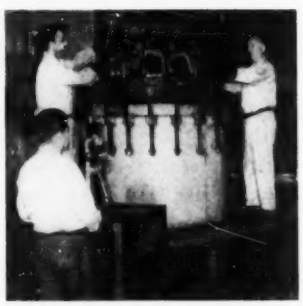
ROPER
Rotary Pumps

GEO. D. ROPER CORPORATION
172 Blackhawk Park Ave.
Rockford, Illinois

type, connected to the cylinder piston rod through a bracket and spring assembly. Each change in the controller signal produces a position change of the piston, and the positioner automatically returns to a null balanced position.

New Castings Salvage Process

A new combination of sealing materials and impregnation methods now makes possible 100 per cent filling of microporous voids in metallic castings, according to an announcement by Polyplastex International, Inc., 441 Madison Ave., New York, N. Y. The solution of the old foundry problem, salvage of castings rejected because of microporosity can now be achieved on a regular production line basis, the company claims.



The process is based on the use of a specially formulated thermosetting resin, Polyplastex MC, in which all of the sealant converts into a solid. It is resistant to solvents, corrosive chemicals, temperature extremes, and pressure, as well as petroleum products.

Leaking castings can be salvaged by one of the following methods: external vacuum, internal pressure, internal vacuum, or vacuum and pressure. Both ferrous and non-ferrous metals can be processed. Illustrated above, a basket of cast ferrous and non-ferrous parts is being removed from vacuum-pressure vessel after impregnation.

Conveyor Belt Weighing System

Development of a new conveyor belt system capable of electronically adding, subtracting, and recording the tons per hour of material delivered to one or more points, was announced by the Minneapolis-Honeywell Regulator Co., Philadelphia 44, Pa. The new system was jointly developed with the Trans-Weigh Co., Wayne, Pa.

The system continuously weighs material and provides running measurements as well as total tonnage. Chart records are automatically maintained and the measurements can be transmitted over a considerable distance to a foreman's office or panel board.

If one large belt supplies several other belts at different places along its length, the system can add and subtract to measure quantity supplied to any or all belts. It can also control the blending of several different materials on the belt.

Three New Truck Models

Three new cab-over-engine truck models have been introduced by the motor truck division of the International Harvester Co., 180 No. Michigan Ave., Chicago 1, Ill. The new additions to the company's L line are the diesel-powered LCD-405, LFDC-405, and LTCD-405.

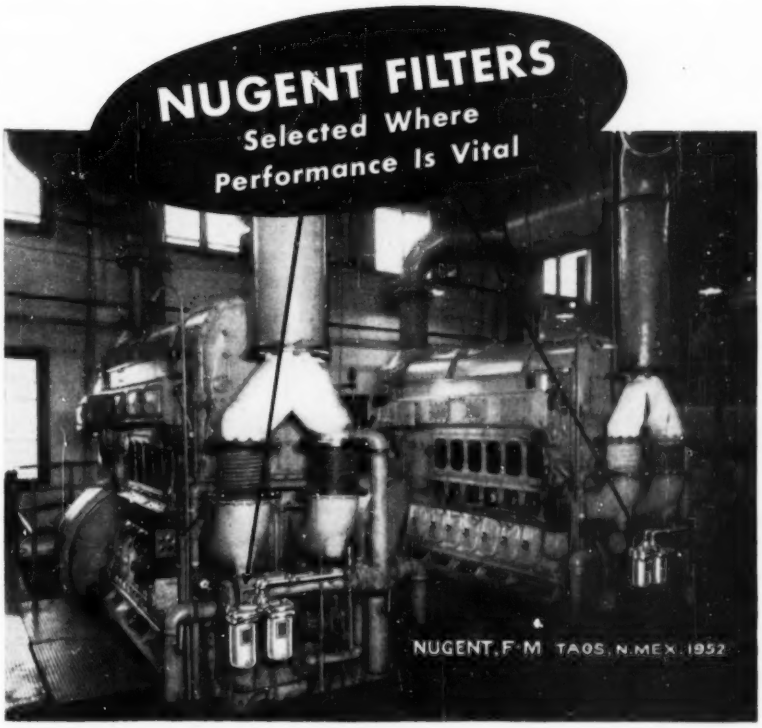
Axle selections include single reduction, double reduction, and two-speed axle drive in the LCD four wheel unit. The LTCD vehicle features the same choice of single axle drive units in combination with dead (load-carrying) axles in either pushing or trailing arrangement. A selection of five dual-drive, tandem-axle assemblies is offered in the LFCD model.

All three models can be used with standardized 35-ft semi-trailer equipment and are available with either the standard or any of 10 optional diesel engines. Optional transmissions include 4-, 5-, and 10-speed designs.

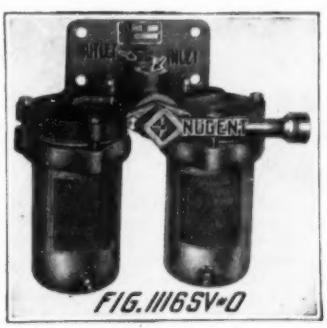
Handle-Type Thermometer

W. C. Dillon & Co., Inc., 14620 Keswick St., Van Nuys, Cal., is producing a thermometer with a hand grip.

In many applications, thermometers cannot be screwed in position but must be held by hand, though ambient or transmitted heat is often too great to bear. The handle on this new instrument is curved to fit the palm of the hand and also acts as an additional protection for the thermometer, completely encasing the edge and underneath portion. Thus it can be plunged directly into hot mixtures.



In romantic, historic Taos, New Mexico trouble-free power service is vitally important. For that reason the Kit Carson REA plant uses three Nugent Duplex Fuel Oil Filters to protect and prolong the life of its three 960 H.P. Diesel Engines. These heavy-duty diesels generate power for all of Taos County, part of Colfax and Arriba Counties and parts of southern Colorado. A break-down in the system would affect 24,000 people including a group of Taos Citizens who drive to work each day at the Los Alamos Atomic Research Center 60 miles away.



Above: Nugent Duplex Filter—the type used to filter fuel oil for the Kit Carson REA plant, Taos, New Mexico

Wherever engines must give long dependable service, Nugent filtering provides the type of protection that is essential. Offering more effective filtering at lower cost, Nugent filters are available in a complete range of sizes and types to meet every need. They utilize inexpensive bag-type cartridges having 20 times the filtering area of other filters of comparable size. Write for full data, outlining your filtering requirements.

NUGENT TRADE MARK

Wm. W. Nugent & Co., Inc.
417 N. Hermitage Ave. CHICAGO 22, ILLINOIS

OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

Representatives in Boston • Cincinnati • Detroit • Houston • La Junta, Colo. • Los Angeles • Minneapolis • New Orleans • New York • Philadelphia • Portland, Ore. • San Francisco • Seattle • St. Louis • Tulsa • Representatives in Canada: Montreal • Toronto • Vancouver

Established 1897

The instrument comes in dial diam of 4¾ in, 2 13/16 in, or 2¼ in and can be ordered in stem lengths up to 72 in. The thermometer proper is of stainless steel and the handle (which can be unscrewed) is of cast aluminum with hammered enamel finish.

Weather Sensing Equipment

Motorola, Inc., 4545 W. Augusta Blvd., Chicago 51, Ill., announces the development of a weather sensing unit for use wherever severe icing conditions and snowfall will impair the operation of moving parts. Most recent application is in the railroad industry to control heaters for automatic rail switches.

The unit, 7¼-in in diam, detects precipitation when ambient temperature drops below 37°F. An integral heater melts the snow and ice collected. No power is consumed by detector or heaters at higher temperatures. It is fully automatic and up to 30 amp at 117 v AC can be switched on without external relays. The heaters will then remain on until the icing hazard is past, being automatically turned off by the detector.

Vise Soft Jaws Use Magnets

The Magne-Grip Tool Co., 4900 W. Madison St., Chicago 44, Ill., is introducing a new type of soft jaws for vises utilizing built-in magnets. Eliminating devices for attaching and holding soft jaws in place, they snap into position and can be removed by lifting them off.

A two-way V-groove locks the work in, holding it in the position desired, regardless of size or shape, it is claimed. The jaws will not "wear out or lose their holding power in years of use and can easily be re-faced."

BEYOND COMPARE
THE FINEST GENERATING AND STARTING EQUIPMENT MADE!
Leece-Neville
L-N GENERATORS
are proving their superiority over conventional standard equipment on thousands of jobs. For 6 and 12 volt systems. High output, long life, reliable performance.
L-N CRANKING MOTORS
High torque, fast cranking speed guarantee quick starts even with cold, stiff engine. For 12 volt and 12-24 volt series-parallel systems. Also higher voltages.
L-N ALTERNATORS
For short runs, long idling, heavy current needs, nothing equals the L-N AC-DC Alternator System. 25 to 35 amps idling! To 80 amps for 6 volt systems; to 175 amps for 12 volt. Also higher voltages.
★ Now producing cranking motors, generating systems, pump motors and special equipment for military engines.
For all the facts, write THE LEECE-NEVILLE COMPANY, Cleveland 14, Ohio
Distributors in principal cities... Service Stations everywhere
YOU CAN RELY ON Leece-Neville
HEAVY-DUTY ELECTRIC EQUIPMENT FOR OVER 43 YEARS
TRUCK
BUS
DIESEL
OFF-HIGHWAY
PASSENGER
RAILROAD
MARINE
INDUSTRIAL

New Literature

New Lubricator Catalog

A 16-page catalog describing force feed lubricators for all types of machinery is now available from Hills-McCanna Co., 3025 No. Western Ave., Chicago 18, Ill. Full details are given of the company's open and closed type lubricators, which are available in capacities from 2 pints to 32 pints with 1 to 24 feeds per minute.

Flexible Tubing Bulletin

A complete line of flexible tubing, in diameters from less than 1 in to 30 in, is described in a new four-page bulletin available from Flexible Tubing Corp., Guilford, Conn. Uses of the tubing include portable and semi-permanent ventilation service, fume removal, dust collection, and materials handling, in original equipment designs and maintenance applications.

The Case for Re-Refined Oil

The Association of Petroleum Re-Refiners, 1917 Eye St., N.W., Washington 6, D. C., has just issued an 87-page publication, *The Case for Re-Refined Oil*, presenting ways to cut oil costs through the use of re-refined oil. Subjects covered include: the technology of re-refined oil; the industry as presently constituted; services; and the problem facing the industry.

Lubrication of Large Engines

The Texas Co., 135 E. 42 St., New York 17, N. Y., is making available copies of its *Lubrication* magazine, November, 1952 issue, dealing with "Some Problems Associated with Lubrication of Large Engines." Some of the subjects covered include: cylinder lubricators, bearing corrosion, engine deposits, and engine wear.

Conveyor Terms and Definitions

The Conveyor Equipment Manufacturers Association, 1 Thomas Circle, Washington 5, D. C., is making available *Conveyor Terms and Definitions*, a manual on standard nomenclature for conveyor types and parts.

The manual contains about 1500 listings and the line drawings of more than 80 types of conveyors and parts. For major items it includes terminology in French, German, Italian, and Spanish, as well as English, and is the product of more than three years of work.

New GM Diesel Booklet

The fall issue of *Power Parade*, GM Detroit Diesel Engine Division's publication dealing with diesel engine applications in the industrial, marine and petroleum fields, is off the press. Free copies may be obtained by writing the division at 13400 W. Outer Drive, Detroit 28, Mich.

Caps and Filler Necks

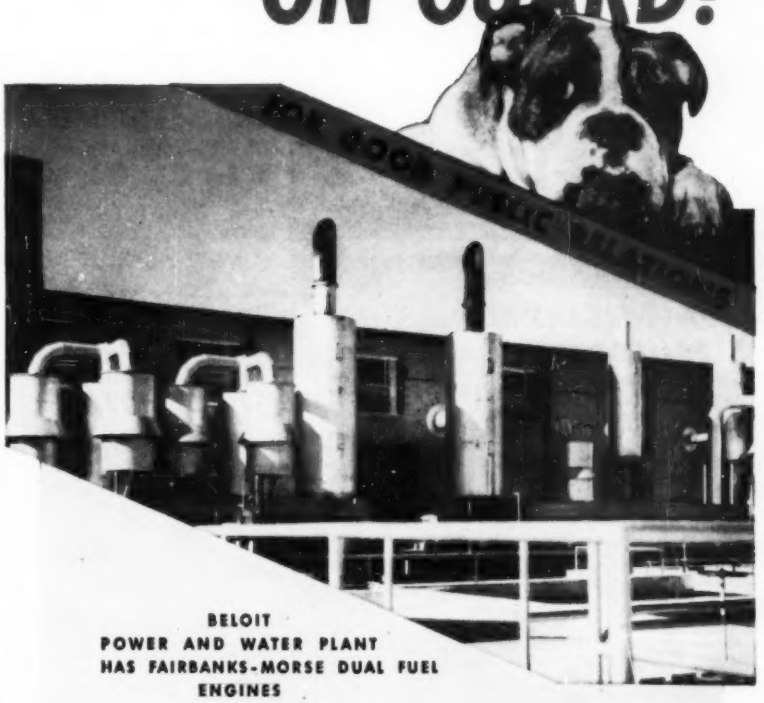
The Eaton Manufacturing Co., 18001 James Couzens Highway, Detroit 35, Mich., has issued an illustrated booklet containing engineering data on its standard line of "Easy-On" caps and related necks for various fluid tank installations.

Vapor Corrosion Inhibitors

Berlin & Jones Co., 601 W. 26 St., New York 1, N.Y., have released two bulletins describing their "VCI Dry-Vapor" packaging. Designed to give ferrous and aluminum alloys protection from corrosion in production and shipment, wrapping papers and envelopes are coated with vapor corrosion inhibitors. The entire process is detailed in the bulletins.

MAXIM SILENCERS

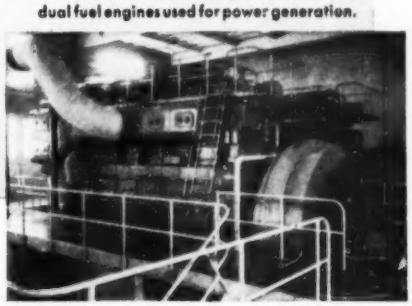
ON GUARD!



BELOIT
POWER AND WATER PLANT
HAS FAIRBANKS-MORSE DUAL FUEL
ENGINES

The new power plant at Beloit, Kansas, is a quiet and good neighbor, 24 hours a day, because of the Maxim Silencers shown above. Illustrated are four exhaust silencers, and behind each of the two-unit oil bath filters a Maxim intake silencer quiets the scavenging air inlet. The larger exhaust silencers serve the two new engines, and the smaller silencers the two older engines. In any municipal plant, good silencing means good public relations. If you have a silencing problem, let Maxim's long experience in this field solve it for you.

The two new 2000 h. p. Fairbanks-Morse dual fuel engines used for power generation.



Consult **MAXIM**

THE MAXIM SILENCER COMPANY
93 Homestead Ave., Hartford 1, Conn. Dept. W.L.

Gentlemen:
Please send me your bulletins on Exhaust and Intake Silencers.

Name _____

Company _____

Address _____

_____

22MX52

Retaining Ring Catalog

Waldes Kohinoor, Inc., 47-16 Austel Pl., Long Island City 1, N. Y., has just released a new 52-page Truarc retaining ring catalog. The catalog devotes 28 pages to engineering data and specification charts giving ring and groove dimensions, clearance, allowable thrust loads, and safety rpm limits.

Six pages graphically illustrate typical cost-cutting and at-random field applications covering self-locking and basic ring types, rings for taking up end-play, and rings applied radially. Assembly and accessory tools, designed to handle retaining rings on a production line basis, are also illustrated and described in detail.

Diesel Race Car Movie

Cummins Engine Co., Inc., of Columbus, Indiana, announces completion of a 45-min, 16-mm film, photographed in color, entitled, "Diesel Race Car."

The movie, which is available for showing without charge, traces the development of Cummins Diesel Special No. 28 through to the 1952 Indianapolis 500-mile Memorial Day Classic, in which the race car won pole position with a four lap qualification speed of 138.010 mph. See *DP*, June 1952 for a detailed report of the event.

Use of Engine Antifreeze

The American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., has published a 16-page report, *Selection and Use of Engine Antifreezes*, designed to provide consumers with practical information and advice on engine cooling system antifreezes and corrosion inhibitors. Other cooling system service products, such as cleaning compounds and stop-leaks, are also discussed.

Prepared by a special group of the members of the Society's Committee D-15 on Engine Antifreezes, the report has a general introductory statement followed by sections dealing with classifications of types, installation and servicing, testing, mixing of different types, re-use of solutions, and stop-leak products.

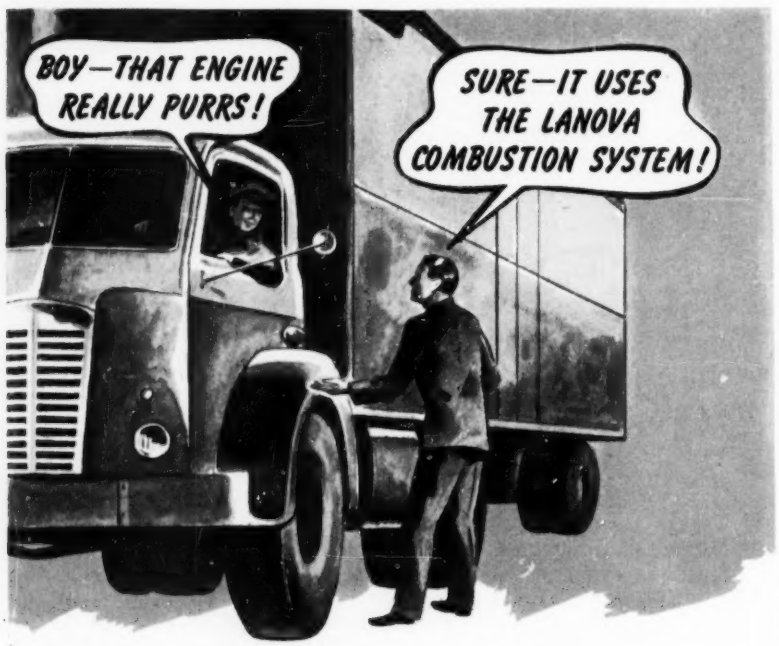
Oil Booster Bulletin

Publication of bulletin AD-103 on its new Peak-Temp oil booster has been announced by the Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12, Wis.

The illustrated bulletin points out the features of the new unit, stressing such factors as quicker heating, lower operating cost, quicker shutdown, trouble-free design, and additional oil storage space. Specifications of the heating element, shell fittings, and oil burner equipment are listed.

Lindberg Air Cylinders

A new bulletin, No. 731, describing its complete line of air cylinders, is available from the Lindberg Engineering Co., 2450 W. Hubbard St., Chicago 12, Ill. Diagrams, charts, and photographs explain the capacity, type of mounting, etc., of the cylinders and a listing of engineering features is included.

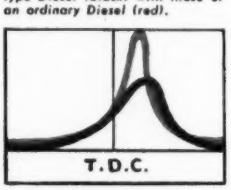


SMOOTH, QUIET OPERATION . . .

is an outstanding operating characteristic of Diesels that use the Lanova Combustion System. Examination of a typical cylinder pressure curve tells why. Instead of the rapid build-up of high combustion pressures so commonly associated with Diesel "knock" and noise, the Lanova System provides a smooth, controlled rate of pressure rise, which produces high mean effective pressures without jarring, hammering pressure peaks.

MANY LEADING MAKES of Diesels use the Lanova Combustion Chamber principle. When you buy your next Diesel, be sure it has the distinctive Lanova energy cell design.

A representative pressure indicator card. Compare the low peak pressures and the smooth low rates of pressure rise in a Lanova-type Diesel (black) with those of an ordinary Diesel (red).



THE LANOVA HANDBOOK

tells the complete combustion story and shows why it's so important in modern Diesel operation.

Lanova

LANOVA CORPORATION
38-18 30th Street
Long Island City 1, N. Y.

ONE OF AMERICA'S FOREMOST NAMES IN DIESEL RESEARCH AND DEVELOPMENT

Nordberg Four-Cycle Engines

Construction, operation and application features of Nordberg 9- and 13-in bore diesel, Duafuel, and spark-fired gas engines, are contained in a new 12-page bulletin just released by the company, Milwaukee 1, Wisconsin.

Bulletin 205 describes the pressure lubrication, high velocity cooling, fuel systems and other design characteristics of the four-cycle engines. Typical installation pictures show various applications. The section devoted to engine performance illustrates the design of the turbocharger. Brake hp ratings are presented in table form together with weights, standard equipment listing and outline dimension drawings.

Engine Indicator Booklet

The Cooper-Bessemer Corp. of Mt. Vernon, Ohio, has prepared a comprehensive booklet, *The Engine Indicator,* to assist operators of gas and diesel engines in keeping equipment at top operating efficiency by use of the engine indicator.

Written by J. D. Hines, research engineer, the booklet reviews the various types of indicators and points out limitations, shows how to analyze indicator cards, and suggests use of the data for balancing engine cylinders and calculating mean indicated pressure. Suggestions are offered to aid in engine design, checking reciprocating compressors, determining indicated hp and mechanical and volumetric efficiency. Included are procedures to avoid mechanical inaccuracy.

Spectographic Analysis

Spectographic Analysis of Diesel Engine Lubricating Oil, published by the American Locomotive Co. of Schenectady, N. Y., in 78 pages of text and photographs describes how this instrument is being used by diesel locomotive engineers to control engine maintenance and prevent costly breakdowns.

The new publication presents an edited transcription of nine technical papers delivered at a symposium sponsored by the company last spring. The papers, complete with tabular data, case histories, and pictures, show how the method had been adapted by leading railroads, together with Alco's own experience in extending the technique on a broader scale.

The spectograph, as used in railroad applications, is a device that makes a photographic record of the metallic elements found in diesel lubricating oil samples removed periodically from diesel engine crankcases. An analysis of the photograph results in an indication of the metallic elements present. Interpretation of the relative quantities gives an understanding of the specific condition of many engine components, such as pistons, piston rings, cylinder liners, and bearings. Avoidance of serious engine failures, longer life of component parts, and more economical operation have resulted, it is claimed.

All of the railroad representatives quoted in the book are substantially in favor of continuing and extending the method. Applications to other than railroad uses are not covered.

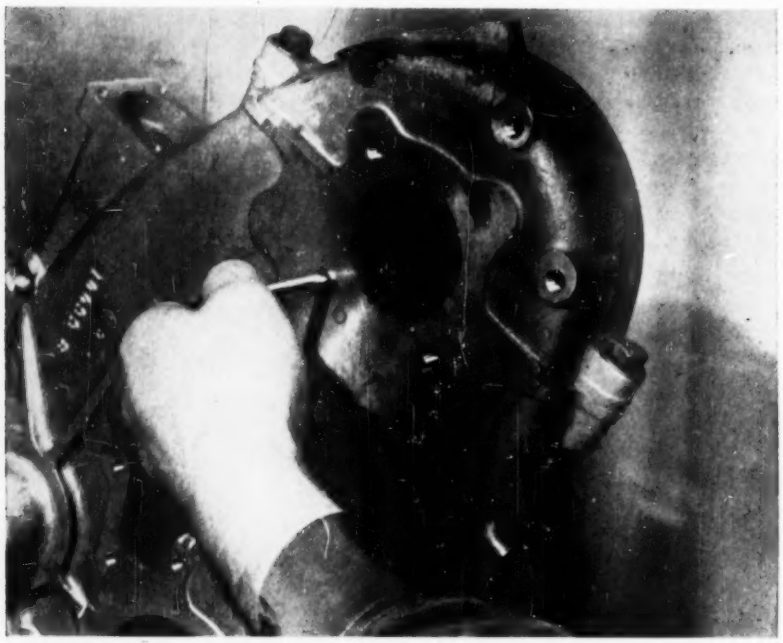
Mutual's Chromates are widely used throughout industry to inhibit corrosion. In the diesel field, they are used advantageously in the water cooling systems of locomotive, marine and stationary diesels — in closed engine jackets, open towers and evaporative condensers. Chromates are particularly effective in combatting corrosion of engine cylinder liners.

Mutual is the oldest and largest manufacturer of Chromium Chemicals. Our technical staff will be glad to advise you on the application of Chromates in your corrosion problems.

SODIUM CHROMATE — SODIUM BICHROMATE
POTASSIUM CHROMATE — POTASSIUM BICHROMATE

MUTUAL CHEMICAL COMPANY OF AMERICA
270 Madison Avenue New York 16, N. Y.
Plants at Baltimore and Jersey City

Field Notes



Helical Thread Inserts Boost Engine Production

Stainless steel wire thread inserts have solved two problems for Fageol Products Company engineers at their Kent, Ohio plant. First, through the use of the inserts as liners for tapped holes in aluminum castings, production of the company's automotive and industrial engines has been increased by six per cent; second, by using the inserts in relatively inaccessible tapped holes, service difficulties in the field have been sharply reduced.

Formerly, in these high-speed engines, such inserts were used only where periodic removal of inspection plates led to accelerated thread wear. More recently, aluminum parts were specified in 40 models of the firm's 6-cyl engines. The low-loading characteristics of threads tapped directly in this metal posed problems in both manufacture and maintenance. Aluminum threads often were damaged in normal assembly and became prematurely worn by regular removal of parts for inspection or adjustment.

By standardizing on the stainless steel inserts supplied by Heli-Coil Corporation of Danbury, Conn., the manufacturer has eliminated thread damage in assembly operations and thus has cut production salvage costs.

Eutectic Corp. to Develop And Market Ciba Products

An exclusive agreement has been reached by the Eutectic Welding Alloys Corp. and the Ciba Co., Inc., to exploit the processes developed from a line of new materials that bond metals together with glass, wood, porcelain, plastic, etc. These may be joined to each other or metal may be joined to glass, fabric to metal, or glass to wood.

The ChemoTec division of the company will manufacture and market under Ciba license using its basic materials and processes.

Ethyl Fellowships Increased

Ethyl Corp. has announced a substantial expansion of its graduate fellowship program for the coming school year, awarding 21 grants for 1952-53 as compared with 12 during the past year.

Initiated 15 years ago, the fellowship program is intended to assist financially in the professional training of research workers. The fellowships are awarded in fields related to the petroleum, chemical and automotive industries, in each of which the company has a direct interest.

Gould-National Batteries Complete $3 Million Plant

Gould-National Batteries, Inc. marked completion of its new $3 million plant in Kankakee, Ill. recently. The plant will build military batteries as well as batteries for civilian industrial use, and will employ about 300 people when it gets into normal production some time next year.

Located on a 30-acre site, the new structure brings to 21 the number of plants operated by the company in the U. S. and Canada. It is the fifth either completed or started within a year as part of the company's $7 million postwar expansion and improvement program.

Canadian Pacific Railway Expands Diesel Program

More than $1½ million has been earmarked by the Canadian Pacific Railway for the construction at Nelson B. C. of facilities for shopping and servicing diesel locomotives, which will transform the company's service in southern B. C. after delivery next year. An estimated $1,689,000 is the appropriation set aside by the company for work on the modern diesel maintenance plant which was begun in July.

In a recent announcement, the CPR indicated that it expected to take delivery next summer of a $15 million order for 73 streamlined diesels and that the new motive power would completely dieselize freight and pas-

senger operations on the Kettle Valley and Kootenay divisions. A maintenance plant at Nelson will be ready to accommodate the first new locomotive to be delivered.

The shop, which will be the second largest of its kind in Canada, will measure 260 ft by 100 ft and will be made of steel and concrete with asbestos siding. It will be equipped with a five-ton crane and a 25-ton crane, plus other facilities necessary for routine diesel servicing. Construction of this new plant is the latest step in the dieselization program which started in 1943.

Tank Air Injection Snuffs Fire at Socony

A blazing fire in a tank containing 2 million gal of fuel oil, believed to be the largest quantity ever ignited for test purposes, was put out in less than two minutes at Socony-Vacuum Oil Company's refinery in Paulsboro, N. J. The blaze was extinguished by injecting air into the lower areas of the tank, thus bringing the cooler product to the top and cutting down the vapors on which the flames were feeding. This is known as the agitation method.

The method requires no costly or intricate devices. Air is pumped into the tank through pipes already built in for other uses, such as pumping-in lines, lines for stirring the oil, or steaming and cleaning the bottom of the tank. Readily available air and a pump capable of producing air at a rate in accordance with the size of the tank, are the only other things needed.

In addition to the fuel blaze, the technique was applied to fires in tanks containing gasoline and crude oil. Agitation alone did not extinguish gasoline and some crude oil blazes but did reduce their intensity, enabling the blaze to be put out easily by conventional methods with simple equipment and much less material.

Marlow Pumps Expands

Marlow Pumps, Ridgewood, N. J., manufacturer of centrifugal pumps, has put into operation a complete branch factory in De Queen, Arkansas. This brings the total of the company's factories to four. Two other factories are located in England and France.

World's Largest Pipeline Is Opened In Iraq

The world's largest pipeline was formally opened in Iraq recently, and will triple the flow of oil from that country. The new oil artery has an annual capacity of more than 12 million tons, is 556-mi long, and was laid down in 17 mo. It was built of 30- and 32-in pipe, the largest in the world, manufactured in the U. S.

To build the line, more than 18,000 tons of pipe in 31-ft lengths were brought from the U. S. in a fleet of 35 ships, some carrying 18 mi of pipe at a time, the 30-in lengths nestling within the 32-in to save shipping space.

The pipes were welded into 93-ft lengths in Syria and hauled into the mountains and desert by 35 specially built gigantic tractors. A ditching ma-

Looks like friend diver is doomed! In *your* business, however, there are no "swordfish" to sever the compressed air supply dependably delivered by Quincy Compressors. You can look ahead to many, many years' service because Quincy builds compressors that withstand long, hard usage.

Depend on a Quincy specialist to help you select the right compressor for your needs. There are modern, compact Quincy Compressors in sizes from 1 to 90 c.f.m.

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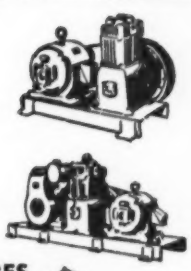

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chine cut a pipe trench 6-ft deep and 4-ft wide, at the rate of 2 mi a day. Six pumping stations and a complete town were built along the line, the third the Iraq Petroleum Co., a joint U. S., British, French, and Dutch enterprise, has built.

New Sulfur Removal Process Licensed by Kellogg

A new catalytic desulfurization process, claimed to be capable of eliminating 90 per cent of the sulfur content in sour middle distillates without appreciable product loss, has been made available to the M. W. Kellogg Co. as a result of a licensing arrangement concluded with Anglo-Iranian Oil Co., Ltd.

The process, known as Autofining, was developed by the British firm over a period of years during which time various pilot plants were built to obtain basic operating data. In addition to a semi-commercial unit of 450-bbl per day capacity at its Scotland refinery, Anglo-Iranian is also operating a 3500-bbl per day plant at its Wales refinery.

The process has significance these days with increasing amounts of high-sulfur crudes being imported from the Middle East and South America as well as from domestic production in West Texas and Rocky Mountain fields. To meet specifications for jet fuels, diesel oil, etc., the middle distillates from all these crudes must be desulfurized.

Conventional processes eliminate enough of the sulfur but may reduce yields to 90 per cent or less because of the formation of sludge. With the British process, it is claimed, refiners are assured of virtually a 100 per cent volumetric yield of middle distillates. Also, problems of waste disposal are said to be precluded.

According to Anglo-Iranian, initial investment cost of an Autofining unit would be appreciably less than for conventional desulfurization plants. Regeneration of the catalyst is required only once a month under usual operating conditions and the catalyst's economic life may be five years. A supply of hydrogen is not required and, it is said, the process will enable use of heavier feed stocks than conventional ones.

European Industrials Served By U.S. Technological Centers

Seven technological information centers are set up in the U. S. to serve European industrialists under the MSA's Technical Assistance Program. Encouragement of technical productivity in Europe is its aim.

It works in the following manner: A manufacturer in one of the Mutual Aid countries wants "know-how" on a certain type of manufacture. He sends his inquiry to his information center, called a Productivity Center, where the query is screened. If it cannot be answered in Europe, it is relayed to the U. S. Department of Commerce, which in turn sends it to one of the centers. Trade secrets are not revealed, however.

Americans get the same type of information from the Department of Commerce, Office of Technical Services, Washington 25, D. C.

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DEMA Meets at Purolator

More than 40 diesel industrial executives and engineering professors attended an educational meeting of the Diesel Engine Manufacturing Association at the Rahway, N. J. plant of Purolator Products, Inc.

Sponsored by the company, the meeting featured a panel discussion on "Filtration as Applied to Diesel Engines". Panel members were: L. W. Manley, Socony-Vacuum Oil Co.; B. P. Emerson, editor, DIESEL POWER AND DIESEL TRANSPORTATION; J. D. Belsky, N. Y. Board of Transportation; C. F. Pervier, Baldwin-Lima-Hamilton; and F. Engelking, Caterpillar Tractor Co. Stuart Cooper, director of industrial relations for the company outlined job opportunities for graduating engineers.

Southern Pacific Exec Terms Diesel "Financial Miracle"

D. J. Russell, president of the Southern Pacific Railroad, in a recent address entitled "Push Button Railroading", before the Pacific Coast Transportation Advisory Board in Los Angeles, told of the many improvements in the technique of railroading which have had a revolutionary effect upon service.

Mr. Russell said in part:

"Probably the most significant change in railroading in recent years has been the revolutionary switch from steam to diesel power. Southern Pacific, for example, which began large purchases of diesel locomotives in 1939, has purchased nothing but diesel locomotives since the spring of 1944 . . .

"Southern Pacific has built large diesel enginehouses and laboratories to keep its diesels in top condition. We now have approximately one million horsepower of diesels in freight service alone, and more on order.

"The economies effected by our diesel locomotives have been responsible, in good part, for what approximates a financial miracle. With only about one-third more revenue per average net ton-mile than ten years ago, we pay more than doubled hourly wage rates, and about double the prices for materials and supplies. Diesels help us do that."

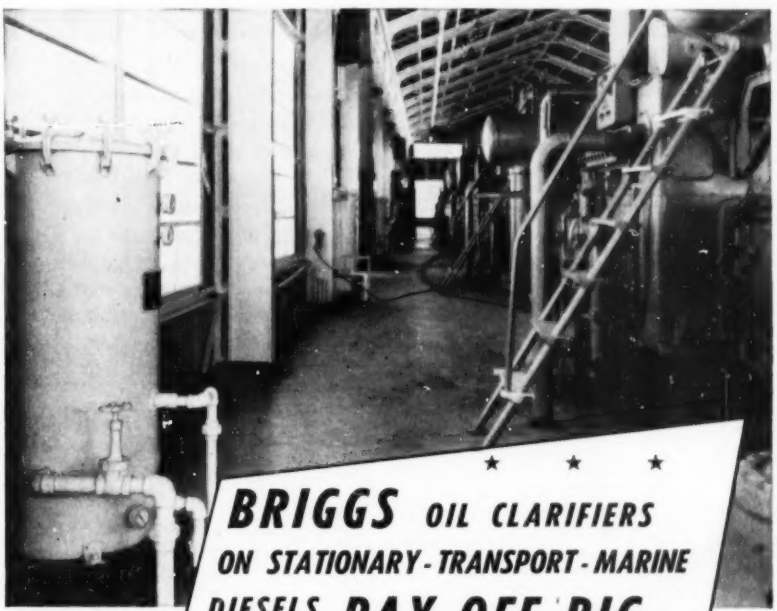
Metal Problem Clinic Set Up

To fit the need in metal working plants for chemical compounds tailored to specific conditions, Charles A. Gerber and Arnold A. Tannenbaum have formed Rutley Industries, Inc. Both men head a staff of experts trained to analyze a metal finishing problem, prescribe the correct chemical formula, and produce it in bulk for the user.

In addition to consultation service and private production of special cleaning compounds, the company is manufacturing a standard line of preparations for welding and brazing. Main offices are in New York City with consulting offices to be set up in industrial areas throughout the nation.

Predict Oil Industry Can Supply All Future Needs

The oil industry can supply sufficient quantities of oil to meet requirements of the U. S. for the foreseeable future even though demand

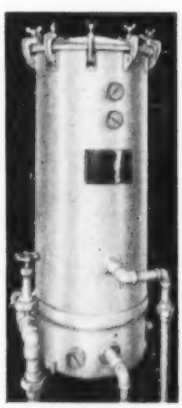


BRIGGS OIL CLARIFIERS ON STATIONARY-TRANSPORT-MARINE DIESELS PAY OFF BIG..

...BECAUSE THEY KEEP LUBE OIL CLEAN—PHYSICALLY AND CHEMICALLY!

100% BRIGGS IS PROOF!

The Transcontinental Gas Pipe Line Station at Ellicott City, Maryland, is one of many installations 100% Briggs equipped. Yes, actually, wherever diesel or gas engines are used, operating men have proved over the years that Briggs Oil Clarifiers are superior—keep lube oil clean at less cost—engines run better.



Model D-B-BB-SV4
One of seven Briggs Oil Clarifiers at Transcontinental in Ellicott City

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THE BRIGGS FILTRATION COMPANY
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FOR MORE THAN A QUARTER CENTURY

will increase almost 50 per cent in the next fifteen years, two speakers, John E. Swearingen and John W. Boatwright of Standard Oil (Ind.), predicted at the annual meeting of the American Petroleum Institute in Chicago.

Total demand will reach 10,280,000 bbl a day in 1967, it was forecast, a 46 per cent gain from the present 7,043,000. In the same period, available crude oil and natural gas liquids will increase to 10,902,000 bbl a day from the present 7,537,000.

Their predictions indicate that "by the end of 1967, cumulative crude-oil discoveries should reach 120 billion bbl, with proved reserves standing at 38 billion bbl—about 13 times the current rate of production."

Erie Freight Service Now Fully Dieselized

With delivery of two diesel locomotives, the freight service of the Erie Railroad became entirely dieselized. This is the conclusion of a dieselization program begun eight years ago. The cost of the program was $80 million.

Passenger service between New York and Chicago was dieselized in 1947, and between Cleveland and Pittsburgh in 1949. Only local commuter service in Jersey City uses steam. With a drop in freight service, it is said this area would also be dieselized.

Forty-six steam locomotives still remain of the 76 owned by the line a few years ago, of which 30 are in actual service.

Pennsylvania RR Announces Freight Improvement Program

A new $47 million program of freight service improvements has been announced by the Pennsylvania Railroad. Expenditures are to be provided from the line's own resources and no additional financing is contemplated.

Included in the program are a new freight yard, a large modern freight car repair shop, new icing stations for perishable freight, new facilities for handling livestock in transit, a new salvage and scrap plant, changes in freight routes, and improved signalling in the areas. It will be a three-year undertaking and will involve western and central Pennsylvania, eastern Ohio, and Jersey City.

The new yard, at Conway, Pa., including track and signal changes in nearby Ohio and around Pittsburgh, will cost approximately $34 million. The freight car repair shop located at Hollidayburg, Pa., eight miles south of Altoona, will cost approximately $12 million. In announcing the new project, the road revealed that its diesel locomotive and car equipment program is now nearly complete.

Materials Handling Show To be Held in Philadelphia

The fifth National Materials Handling Exposition, which will be held at Convention Hall in Philadelphia, May 18-22, will be the largest capital goods show to be held anywhere in the country during 1953, it was announced by the management.

The exposition, held for the first

"FIXED-READING"
PREMAX
PRESSURE INDICATOR
for DIRECT-READING
OF COMPRESSION AND
FIRING PRESSURES
OF EVERY TYPE OF DIESEL ENGINE
ONE OF THE FEATURES
Responsible for Its Overwhelming Preference by Leading Diesel Manufacturers and Operators
Successive readings may be taken rapidly since no venting of the instrument is required between readings. No closing of valves required to change from firing pressure to compression pressure reading.
For other features, write for Bulletin 294
ACCURATE PRESSURE READINGS as high as 1700 P.S.I.
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OVERSPEED GOVERNORS

Synchro-Start Overspeed Governors are made for shut-down at any predetermined RPM by either opening or closing a circuit and speed can be adjusted while the engine is running.

Rotating parts of the GF's run in sealed ball bearings, lubricated for life and equipped with tachometer drive take-off.

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All models can be mounted in any position and an angle drive attachment can be furnished for GKA and GKM.

For further information write for Bulletins 409 and 409-A

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Get BETTER Control with POWERS FLOWRITE VALVES

VALVE TOP—Durable moulded neoprene diaphragm (1) has positive sealing bead which provides increased sealing action with increasing control pressure. Efficient diaphragm form insures ample and constant operating power thru full travel. Piston Plate Assembly (2) has a free floating thrust plate which absorbs side thrust. Closely guided piston plate maintains stem in accurate alignment.

ADJUSTING SCREW—Ball bearing non-rising type with starting pressure adjustable from 0 to 17 psi. Has enclosed rust proofed steel spring for full travel in 5 or 10 psi. control pressure change.

BONNET ASSEMBLY—Polished stainless steel stem in preformed lubricated metallic packing insures long life and low hysteresis.

VARIETY of VALVE BODIES
Sizes ½" thru 8"
For line pressures below 250 psi. Rugged construction to withstand piping strains.
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Reduce Maintenance with FLOWRITE VALVES

THE POWERS REGULATOR COMPANY
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time in 1947, is expected to attract 25,000 visitors from 40 countries. A study made at an earlier show revealed that 90 per cent of those who attend are directly responsible for authorization or recommendation of purchase of capital goods for their company.

All six halls of the building will be used to house exhibits and a covered railroad siding also will be occupied. Ninety-eight per cent of available exhibition space was sold earlier this year, and 255 companies will display, many of whom will operate their machines under simulated factory conditions.

The Material Handling Institute will sponsor the exhibition. Concurrently with the show, the American Materials Handling Society will conduct a series of conferences.

New DEMA Officers Elected

Election of officers of the Diesel Engine Manufacturers Association for 1953, took place at the annual meeting of the organization in New York City. A. W. McKinney, executive vice president of the National Supply Co., was elected president.

Two vice presidents were chosen: Walter A. Rentschler, vice president of Baldwin-Lima-Hamilton Corp., and

New DEMA President

William E. Butts, president of Enterprise Engine & Machinery Co. Robert H. Morse, Jr., president of Fairbanks, Morse & Co., was continued as treasurer, and Harvey T. Hill continued as secretary and executive director.

The following men will serve as directors: William S. Morris, vice president of American Locomotive Co.; C. Paul Clark, president of Clark Bros. Co.; Gordon Lefebvre, president of the Cooper-Bessemer Corp.; George W. Codrington, vice president and general manager of the Cleveland Diesel Engine Div. of General Motors; Harald T. Reishus, general manager of the Industrial Power Div. of International Harvester Co.; M. C. Davison, vice president of Ingersoll-Rand Co.; Robert E. Friend, president of Nordberg Mfg. Co.; Otto H. Fischer, president of the Union Diesel Engine Co.; and E. J. Schwanhausser, executive vice president of Worthington Corp.

TOCCO Equipment Complies With Radio Interference Control

The TOCCO Division of the Ohio Crankshaft Co. announces that all its equipment is certified to comply with the regulations of the Federal Communications Commission regarding radio wave emanation.

The problem of interference with commercial radio communication was brought about by the increase in use

of high-frequency electric current by American industry since the war, especially in the use of induction heating equipment. The FCC studied the problem and in 1947 their regulations for control of radio wave emanation became law.

This regulation in summary, states as follows:

After June 30, 1952, all equipment in the above category shall operate either in assigned frequency channels, or if outside of an assigned frequency channel, shall be certified to have a radio wave radiation level of less than 10 microvolts per meter at a distance of one mile from the equipment.

Ramsey Buys New Facilities

Purchase of all the assets of the Chemical Division of the Maplewood Products Corp., St. Louis, by the Ramsey Corporation has been announced. The company states that acquisition of these new facilities will improve delivery service and manufacturing methods of its Ramco 3-Up parts cleaner.

New Exposition to Present Developments in Materials

An international exposition, claimed to be the first of its kind, has been announced by Clapp Poliak, Inc., New York. It is planned to meet the needs of industrial "worlds of tomorrow" by presenting under one roof the whole range of new materials flowing from the laboratories of industry and needed for product development.

Called "Exposition of Basic Materials for Industry," the show will be held in New York at Grand Central Palace, June 15-19, 1953. Top executives of 20 major companies are included in the sponsoring board.

Simultaneously with the exposition, a series of technical conferences will be conducted to discuss the properties and potentialities of the new materials. The event is intended to create a new source of information and ideas for engineers, research scientists, and executives by giving an integrated picture of materials fundamental to product development.

More than 15,000 executives are expected to attend from every major manufacturing center of the world. Almost 2,000 experts will be on hand to lead conference discussions and answer questions at exhibits.

Besides the emphasis on new materials, the exposition will demonstrate new uses for standard products. Product components and accessories will also be featured.

Honeywell to Open New Plant

Minneapolis-Honeywell Regulator Co. will open a new manufacturing operation in Minneapolis within the next few months for expanded defense production, it was announced. A 38,000-sq ft building has been leased and will be converted for production work.

It will become the company's eighth manufacturing plant in that city, and is the second new plant announced by the firm in recent weeks. Earlier, it was disclosed that a factory is being established in Amsterdam, The Netherlands, to produce home heating controls abroad for the first time in the company's history.

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Positive Displacement
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There's no place for guesswork in the lubrication of diesel engines and power units. Tuthill pumps provide a positive method of lubricating and scavenging. Dependable, economical automatic reversing pumps and stripped models for incorporating directly into the design of your engine are available to meet any lubrication requirement. Send your specifications for recommendations on the Tuthill pumps best suited to your needs.

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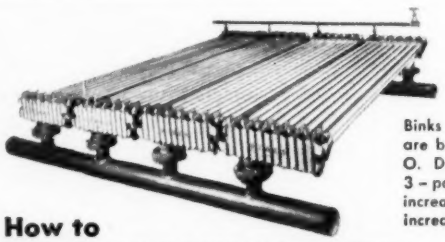

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How to
SAVE COOLING WATER...
and insure uniform heat transfer

When you use Binks Type "D" Heat Exchange Coils, here's what happens:

Hot water from the engine is pumped through the copper tubes of the coils (shown above). The coils are cooled by spraying them with raw water in a standard Binks cooling tower. Because jacket water is circulated through a completely closed system with virtually no evaporation, distilled or chemically pure water can be used economically in the jacket. This eliminates scale formation... increases engine efficiency.

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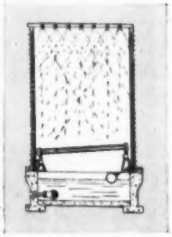
Send now for Bulletin 41 for complete engineering data.



View showing placement of Binks Type "D" heat exchange coils in a cooling tower in relation to the spray system (at the top).

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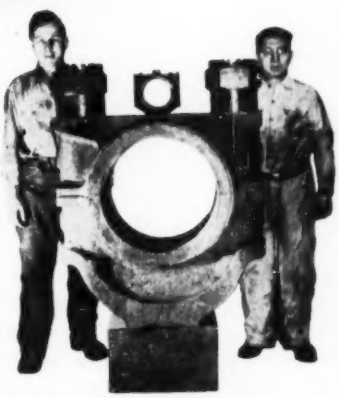

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REPAIR AND SERVICE on Woodward Governors, all types of fuel injection equipment and centrifuges.

FULLY EQUIPPED SHOPS for repairs and manufacture of parts, for pipe bending and coppersmith work; large stock of spare parts on hand.

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NORLANTIC DIESEL, INC., New Bedford, Mass.

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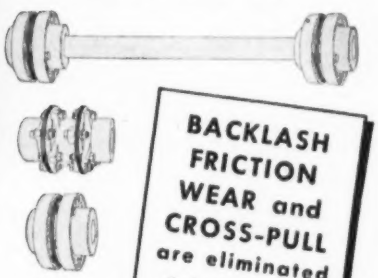
Flexible ALL METAL COUPLINGS

FOR POWER TRANSMISSION
REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

Specialists on Couplings for more than 30 years



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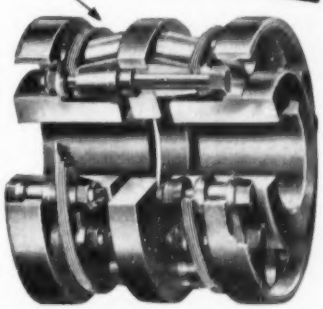

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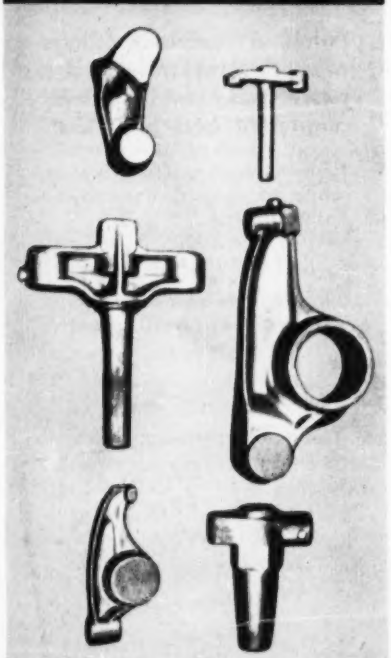
For major diesel engine manufacturers



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with less weight

TOUGHER
with refined grain structure

SAFER
with improved physical properties

DEPENDABLE
for modern high speed operating mechanisms

INDIANAPOLIS DROP FORGING CO.

1300 Madison Ave. Indianapolis 7, Ind.

What Do You Know!

(*Answers to questions on Page* 36)

1. Correct answer is "b". It has been found entirely practical, when proper precautions are taken, to protect the items of electrical equipment. See the article starting on Page 40.

2. "c" is correct. The object is to reduce any appreciable residue and to prevent any selective attack on unprotected metal in these spots. See article referred to above.

3. Correct answer is "a". While reducing speeds, such units increase tractive effort through greater adhesion that is spread over more driving axles. See Page 37 for details.

4. Correct answer is "a", since this is the basic characteristic that may be affected by both "b" and "c" within the range for the gray cast irons. For more details see the article starting on Page 60.

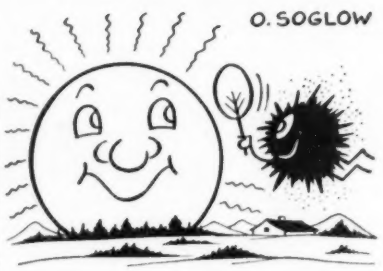
5. Ductility ("c") is one of the major characteristics distinguishing this type of iron from the gray cast iron. For more on this and other qualities, see article mentioned above.

6. Correct answer is"a". No one solution has been found to be universally effective with all additive type oils. For a discussion of this, see the article that starts on Page 50.

7. Correct answers are "c" and "d". Degree of sensitivity will greatly depend on percentages, alloying agents, etc. A more complete list of bearing materials and their relative vulnerability to corrosion is given in the article mentioned above.

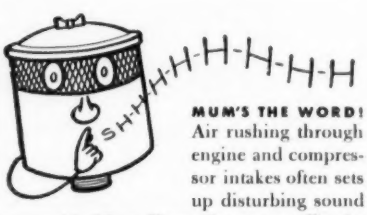
8. Correct answer is "a". Fuel quality will not only affect the type and quantity of residue, but will also affect the manner of combustion. This also will affect deposits. This and other important considerations are fully discussed in the article to which we referred in the previous two items.

AIR-MAZING FACTS



DUST COOLS THE SETTING SUN! As the sun gets closer to the horizon its rays have to pass through more of the earth's dusty atmosphere. That's one reason why the sun doesn't feel as hot late in the day as it does at noon.

CLEAN BILL OF HEALTH FOR OIL! Harmful abrasive particles are removed from engine lubricants and fuels by Air-Maze liquid filters. Special "disc" construction provides many times more effective filter area than other types. Filter is all-metal. Like new after cleaning.



MUM'S THE WORD! Air rushing through engine and compressor intakes often sets up disturbing sound waves. Air-Maze filter silencers muffle the noise, help employees work better, keep the neighbors happy.

WHETHER YOU BUILD OR USE engines, compressors, air-conditioning and ventilating equipment, or *any device using air or liquids* — the chances are there is an Air-Maze filter *engineered* to serve you better. Representatives in all principal cities, or write Air-Maze Corporation, Cleveland 5, Ohio.

AIR-MAZE

The Filter Engineers

AIR FILTERS
SILENCERS
SPARK ARRESTERS
LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS

FM's Train Master

(*Continued from page 59*)

locomotives having similar motor and wheel arrangements.

The one and one-half ratio has also been carried out in provision for operating supplies. This means that the balance of fuel tank capacity versus weight of trains handled will be better when compared to conventional 1600-hp freight locomotive units. Variable operating supplies have been arranged for equal weight distribution on the drivers.

Summing Up

F-M feels that they now have a high-horsepower locomotive not only unequalled in freight service but, due to design features, one capable of broad application in other services. All appurtenances and accessories required for various services can be applied to any one unit with no necessity for substituting one feature for another. This makes for the broadest kind of utilization.

F-M also points out that two "Train Master" units coupled to make a 4800-hp locomotive equipped for freight service and with dynamic braking will cost about $40,000 less than any 3-unit locomotive with similar ratings, capacity and equipment. In addition there is one less unit to maintain.

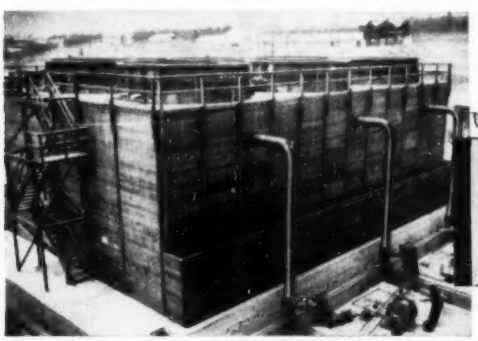
The first 10 of the "Train Masters" to be built will be delivered to the Lackawanna Railroad. Current production schedules call for completion of the first unit early in 1953.

These Diesel Lubricating Pumps
Nos. 53 & 55
ROTARY GEARED PUMPS
with Helical Gears
and Roller Bearings
. . . " grow old GRACEFULLY "

HERE ARE exceptionally long-lived, efficient pumps for your diesel's pressure lubricating system up to 200 p.s.i. Nos. 53 & 55 Brown & Sharpe Rotary Geared Pumps have very accurate helical gears and roller bearings . . . provide smooth flow at high speeds. Leakage is prevented by mechanical seal . . . no glands to wear out. Their long, trouble-free performance is proved in thousands of diesel installations. Available with capacities from 4 to 34.1 g.p.m. at 0 lbs. pressure. Write for complete Pump Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

WE URGE BUYING THROUGH THE DISTRIBUTOR

BROWN & SHARPE BS

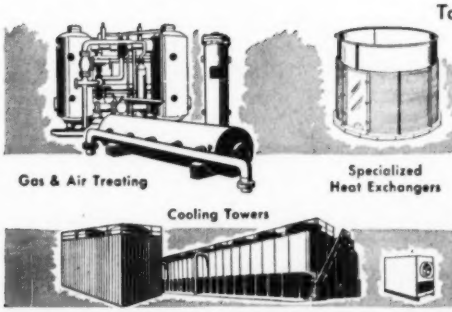


Regardless of Altitude or Engineering Problems...

Pritchard
Quality COOLING TOWERS
Meet Exacting Specifications

Tough cooling jobs are easily and efficiently handled by Pritchard Quality Cooling Towers. Take this Mexico City installation. Jacket water from 6 heavy-duty diesels gets a cool-down from 110° to 90° F. at the rate of 12,960 GPM...*and* at more than 7,000 feet above sea level! Like every Pritchard Quality Cooling Tower, this unit was built and guaranteed to deliver rated performance with output to spare in emergencies. Why don't you, too, find out about the advantages of using Pritchard Quality Cooling Towers to handle your water cooling problems? Consult your nearby Pritchard representative for full information.

Request free illustrated bulletin today.



Products of QUALITY Specialized Process EQUIPMENT

J.F. Pritchard & Co.
EQUIPMENT DIVISION
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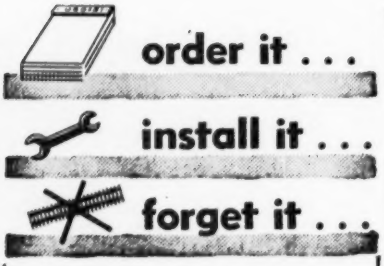
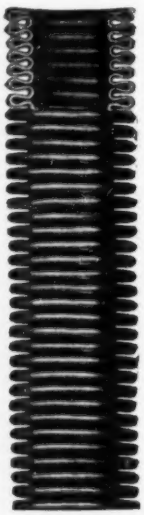
District Offices: CHICAGO • HOUSTON • NEW YORK • PITTSBURGH
TULSA • ST. LOUIS • Representatives in Principal Cities from Coast to Coast



You can do that with ATLANTIC seamless diesel hose which requires no maintenance whatever.

Absolute uniformity of wall thickness . . . no seams or packed joints . . . absolutely tight against water, oil, steam, gas, air . . . dampens vibration . . . . maintains flexibility at extremely high temperatures.

Bronze, Steel, Stainless Steel, Monel — ⅛"—36" I.D. with fittings as needed.



Diesel Bulletins 1020 & 50A furnish complete information.

See our Catalogs in Sweet's Files for Product Designers and Mechanical Industries.

ATLANTIC

METAL HOSE CO., INC.

109 West 64th St., New York 23, N. Y.

Organizational News

Federal-Mogul General Manager

Thomas L. Camp has been promoted to general manager of Federal-Mogul Corporation's service division. He succeeds N. A. Moore, who has resigned.

As head of the division, Mr. Camp

Thomas L. Camp

is responsible for all service districts. He has had 21 years of experience in the division, joining the company as a salesman in Los Angeles in 1931.

GM Director Appointed

Elmer Bailey has been appointed director of the service section of the General Motors Technical Center, it was recently announced.

Mr. Bailey joined General Motors in 1942. In 1950 he was temporarily assigned to the Technical Center and was named resident comptroller in 1951.

Dravo Director Designated

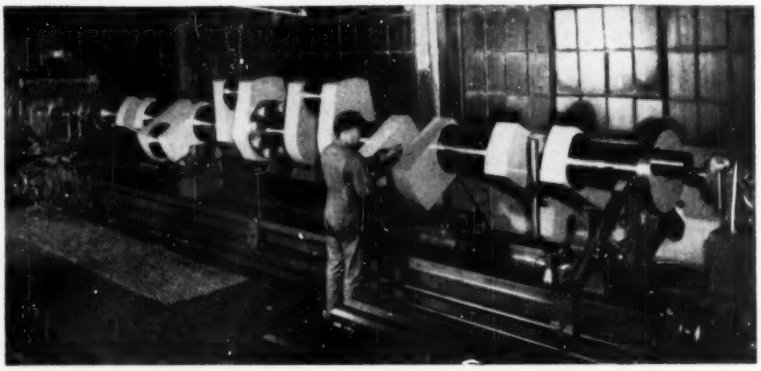
W. L. Newhall has been appointed director of the Dept. for Research and Development, for Dravo Corp. and subsidiaries. He has been with the company since 1925 and is a graduate of MIT.

Cummins Promotions

Three promotions in the engineering department of Cummins Engine Company, Inc., Columbus, Indiana have just been made public.

J. C. Miller, formerly manager—research and refinement, has been named

DIESEL CRANKSHAFT REPAIRING AND REFINISHING



Picture shows a thirty-foot crankshaft with 13" diameter journals which was broken through the No. 6 web— receiving final inspection after new crank and center coupling sections were installed and machined to original tolerances.
Shafts of all sizes and types successfully repaired and refinished.
Call, wire or write for particulars on our field repairs and emergency service.

WASHINGTON IRON WORKS, INC.

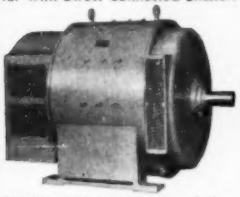
Established 1876

SHERMAN, TEXAS

Champion Performers

COLUMBIA

93.8 KVA, 900 RPM, A. C. Generator with Direct Connected Exciter.



200 KW, 900 RPM, Protected, Two Bearing D.C. Generator.

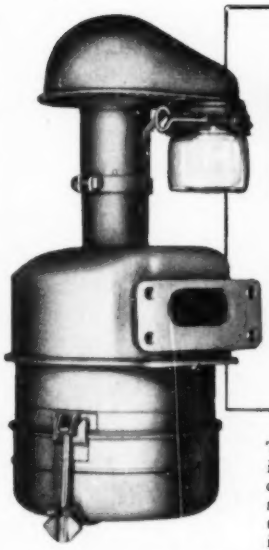
A. C. AND D. C. GENERATORS. For the greatest exhibition of quality and service use performance proved Columbia A.C. and D.C. Generators. Available for coupled service, belt drive, single or two bearing.

A. C. Generators: 6¼ to 1000 KVA
D. C. Generators and Exciters: 2 to 300 KW

Write for descriptive literature. Our engineers will be glad to review your requirements.

Protected Territories Available to Qualified Sales Engineers.

COLUMBIA ELECTRIC MFG. CO.
4537 HAMILTON AVE. · CLEVELAND 14, OHIO



Donaldson Air Cleaners are EASY TO SERVICE!

The simplicity and speed of servicing Donaldson Air Cleaners encourages regular attention by the machine operator. No tools are needed to remove oil cup. Cleaning cup and re-filling with oil is a two-minute job. Removable tray makes cleaning out chaff, lint, leaves and larger foreign particles simple and fast.

CUSTOM-BUILT TO FIT YOUR ENGINE

Write our engineering department for air cleaner recomendations.

DONALDSON CO. INC.
666 Pelham Blvd., St. Paul 4, Minn.
Grinnell Division: Grinnell, Iowa
Donaldson Company (Canada) Ltd., Chatham, Ontario

Donaldson Air Cleaners Mufflers

executive engineer in charge of all product engineering and research activities. He had 20 years of experience in the automotive field, before joining the company in 1947.

D. B. Worth becomes manager—field quality in charge of coordinating field and factory studies of product quality control. He was formerly manager—product engineering, a position he held since 1942.

N. M. Reiners is now manager—research and refinement in charge of the company's research activities. He had been manager—research laboratory since 1947.

Baldwin Names Eastern Rep

Robert S. Oberlander has been appointed factory representative for the application and sale of both Hamilton and Baldwin stationary and marine diesel engines on the Eastern Seaboard north of Washington, D. C., it was just made known by the Baldwin-Lima-Hamilton Corporation, Hamilton, Ohio.

Mr. Oberlander has been with the organization since 1941 and with its diesel engine department since 1943, becoming manager in 1950.

White-Roth Names VP

Robert I. Roth has been appointed vice president in charge of western

Robert I. Roth

sales by the White-Roth Machine Corp. of Lorain, Ohio. He will make his headquarters in Dallas, Texas.

Mr. Roth will be in charge of distributor sales and engineering service for Lorain gas and diesel engines. A sales engineer since his release from the Navy, he is a graduate of Case Institute of Technology.

Worthington Election

C. Robert Maranville, formerly assistant to the works manager of the Holyoke, Mass. plant of Worthington Corp., has been elected assistant treasurer of the corporation by the board of directors.

Mr. Maranville has been associated with the company for the past 16 years, first being employed in the comptroller's office at the Harrison, N. J. headquarters. In 1937, he was transferred to the Holyoke plant where he served successively as office manager, works comptroller, and assistant to the works manager.

Purolator Appointment

Richard T. Karr, formerly a sales engineer in the Detroit office of Purolator Products, Inc., has been appointed assistant to the vice president in charge of sales at Rahway, N. J.

Mr. Karr has been with the company since 1937 and prior to service in the Air Corps, was in the engineering department where he participated in the development of aircraft filters.

Alco Director of Engineering

H. L. Weinberg has been appointed director of engineering for the American Locomotive Company. He takes over the duties of John Thomas who has been assigned to the administrative staff.

H. L. Weinberg

Mr. Weinberg joined the company in 1944 and served as chief engineer since 1950. He was previously employed as equipment electrical engineer by the Union Pacific Railroad and as manager of diesel locomotive service for the Baldwin Locomotive Company. He is a native of Texas and a member of the American Society of Mechanical Engineers.

Dollinger Appointment

George A. Schiller has been named assistant sales manager of the Dollinger Corp., Rochester, N. Y. He was formerly associated with the Dustex Corp. in Buffalo.

Mr. Schiller served as a Navy pilot in World War II. He is a member of the New York State Engineer's Society.

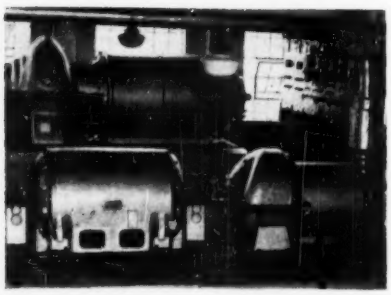
Consulting Engineer Retires

James A. Rabbitt, consulting engineer, and an authority on Japan and the Far East, retires from active service with the International Nickel Company, Inc. He has been with the company for more than 22 years.

Sterling Engine Appointment

George D. Thomas has joined the application engineering field sales staff of the Sterling Engine Co. In his new capacity, he will work in close co-

how to get equipment LOOKING LIKE NEW



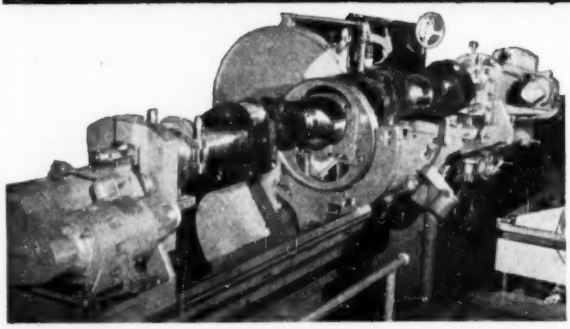
If your diesels, generators, other heavy equipment need brightening-up, give them a quick wipe-over with Oakite Renovator.

Mixed with water, Oakite Renovator combines both solvent and emulsifying cleaning action. It quickly removes oil, grease, grime, fingerprints . . . makes your equipment look "good as new!"

Easy to use! Easy on the hands! Just go over surfaces with Renovator-soaked cloth. Then polish with dry cloth. No rinsing! For complete story send for the Oakite Power Plant Cleaning Digest. It gives 71 good tips on how to save time and money on power plant maintenance cleaning. Digest is FREE. Write Oakite Products, Inc., 22C Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE
Technical Service Representatives Located in Principal Cities of United States and Canada

CRANKSHAFT GRINDING SERVICE



Established 1924 . . . 28 years experience grinding crankshafts! The most complete engine rebuilding shop in the Southwest!

THE LARGEST CRANKSHAFT GRINDING MACHINE IN THE WORLD USED IN AN INDEPENDENT REPAIR SHOP

★ HARD CHROMIUM PLATING SERVICE
★ CRANKSHAFT STRAIGHTENING SERVICE
★ MAGNAFLUX SERVICE

Four machines giving range from the smallest up to crankshafts with stroke of 16" and 200" O.A.L. Complete grinding service for locomotive, stationary, marine, automotive and compressor crankshafts. Undersized journals restored to size by hard chromium plating.

NATIONAL WELDING & GRINDING CO.
2929 CANTON ST. DALLAS 1, TEXAS

Left: 2200 Class Mechanical Governor
Right: 3200 Class Hydraulic Governor
GOVERNORS by PICKERING
3700 Class Hydraulic Governor
For 90 years the name Pickering has been associated with fine governors. The full line covers all requirements of diesel, dual fuel, steam and gas engine as well as turbine speed regulation.
ALL MODELS AVAILABLE IN EITHER CONSTANT SPEED OR VARIABLE SPEED TYPES.
To secure complete research and design engineering co-operation on governor problems, write
2600 Class Mechanical Governor
THE PICKERING GOVERNOR CO.
affiliated with
BUEHLER INC.
PARAMUS—NEW JERSEY

® KIENE

DIESEL INDICATOR VALVES

KIENE VALVES are designed to give good service under most severe conditions, WILL NOT BLOW OPEN, as valve opens against pressure. The KIENE VALVE HAS EFFECTIVE GAS SEAL when opened or closed, without use of packing or glands.

The KIENE VALVE is SMALL AND RUGGED, 4¼" in length and requiring only 3¼" circle of space for attachment. Has been operated at pressures up to 10,000 psi. ALL KIENE VALVES have standard indicator plug and wing nut connection. Regularly furnished with male ½" NPT engine connection. Other threads furnished on order. Special adaptions for most Diesel locomotive engines.

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

Cast Iron That Bends

(*Continued from page* 61)

same yield strength. It has proven to be surprisingly resistant to shattering types of failure.

Ductile iron has a considerably higher yield point than most foundry alloys excepting the high-strength steels. This is important since most design engineers base their determination of load-carrying ability on yield strength. This property makes it an excellent piston material and a number of such diesel engine pistons are currently in use.

It is interesting to note that the combined properties of this material permit it, under certain conditions, to compete with aluminum on a strength-weight basis. Ductile iron diesel pistons are being designed that will have the same weight as the aluminum ones currently being used.

Fabrication—The spheroidal graphite iron can be welded by the same techniques established for gray iron. It can be welded to steel, highly-alloyed materials, and to itself. Using nickel-iron core wire with a carboniferous coating, weld metal has shown tensile strengths of 60,000 psi and ductility ranging up to 10 per cent depending upon thermal conditions.

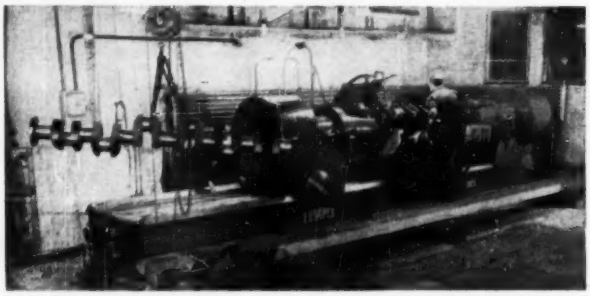
With regard to machinability, ductile iron is superior to gray iron. In the as-cast condition, it is roughly comparable to gray iron of equal hardness although the tensile strength of the gray iron is only half that of the ductile iron. The latter when annealed can be machined at two to three times the rate for a good quality gray iron in the as-cast condition. This means that the output of a machine can be doubled or tripled by substituting annealed ductile iron for gray iron. In addition to obtaining a product with improved physical properties, reduced machining cost will generally offset the slightly higher cost of the rough casting.

Summing Up

It is evident that this material combines the process advantages of cast iron with the product advantages of steel. From the engine component point of view, the important advantages of cast iron are retained and the possibilities for their utility increased.

Ductile iron is not a brand new material ready for application in the engine industry; it is already in. Crankshafts, pistons, cylinder heads, etc., are already in use and new applications are being explored. This is just simply one case where nothing much was said about the material until after it was put to use. Incidentally, the first licensee was the Cooper-Bessemer Corporation.

Many metallurgists feel that this is the most outstanding foundry development since that of the American-type malleable iron in 1820. In any case, it appears to have fewer limitations than the older materials and important individual properties. Thus, it should become increasingly important in engine construction.



BRODIE SYSTEM
AN ENGINEERING SERVICE

Recent installation of the NEWEST and LARGEST crankshaft grinder in a jobbing shop.

WORN, BENT OR BROKEN CRANKSHAFTS
Built up by metallizing
and ground to factory
specifications.
Ground undersize.
Thermit welded.
Aligned.
LARGE CRANKSHAFTS OUR SPECIALTY
Complete facilities for Diesel
Engine repairs.

BRODIE SYSTEM 115 Clifton Place, Brooklyn 5, N.Y. Phone Main 2-5242

operation with consulting engineers and installation contractors of the company's customers.

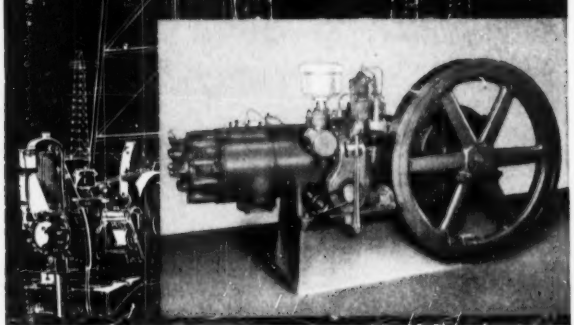
Mr. Thomas comes to the company from the vice presidency of Sinex Projects, Inc. Over the past 30 years he has designed and supervised electric power installations such as the Gilboa Dam, British West Indies Air Fields, Voice of America Tangiers Station, and others. His past accomplishments give him a thorough understanding of diesel-electric power generation and application problems.

RR Rep for Gustin-Bacon

W. E. Vergan has been appointed special representative of the railroad department of Gustin-Bacon Manufacturing Co. of Kansas City, Mo. He recently resigned as superintendent of air equipment and diesel operation for the Missouri-Kansas-Texas Railroad, which he has served for 30 years.

Mr. Vergan is a former president of both the Air Brake Association and the Southwestern Railroad Diesel Club. He has recently been voted an honorary life membership in the Railway Fuel and Traveling Engineers Association for his contribution to the air brake field.

For low-cost power rely on
LORAIN Multi-Fuel ENGINES



55 HP Lorain Model DA with gasoline starter

. . . full line from 10 to 55 HP

Lorain diesel or gas engines are built with an extra margin of stamina to stand up to gruelling service. Simple 2-cycle, single-cylinder design reduces moving parts for dependability. They operate as cold-starting diesels or can be converted easily and quickly in the field for natural gas or butane.

Get full details on Lorain Multi-Fuel Engines. *They operate longer without attention . . . operate longer between overhauls.* Write for specifications today. A-5973

WHITE-ROTH *Machine Corp.* LORAIN, OHIO

CHRISTMAS SEALS HELP MAKE TB CURES POSSIBLE

New methods of treatment make it more important than ever to find the 150,000 "unknown" cases of tuberculosis—people who are infecting others . . . and losing their own health.

These "unknowns" must be found and spread of infection controlled—by more chest X-ray, educational, and research programs. These are just some of the activities encouraged and supported by your Christmas Seal dollars.

Remember, no one can be "cured" until treated . . . and no one can be treated until found. So, continue the winning fight against tuberculosis. Send in your contribution today.

BUY CHRISTMAS SEALS

Because of the importance of this message, space contributed by

DIESEL POWER and DIESEL TRANSPORTATION

J. H. Bennet, Jr.

L. H. Bobo

Pedrick Division Managers

Announcement is made by Wilkening Manufacturing Co., maker of Pedrick piston rings, of the promotion to divisional sales managers of John H. Bennet, Jr. and Leslie H. Bobo.

Mr. Bobo joined the staff three years ago after various experience in other fields. He will headquarter in Memphis. Mr. Bennet worked for the George T. Little Implement Co. in South Carolina prior to joining the company as a territory manager.

Rock Island Promotes

John M. Spann, general freight traffic manager of the Rock Island lines, has been promoted to assistant to the president with headquarters in Fort Worth, Texas.

Mr. Spann entered service on the railroad in 1925 as chief clerk. Previously he had been with the Fort Worth & Denver City railway. He has been general freight traffic manager since September, 1951.

Aro Advancement

A. N. Abelson has been appointed vice president in charge of manufacturing of the Aro Equipment Corp., Bryan, Ohio. Formerly general manager of the Cleveland plant, he will now be responsible for all production at both plants.

Mr. Abelson served his apprenticeship at Brown & Sharpe Mfg. Co. as a tool maker and machinist. He came to Aro in 1941 as first works manager of its Cleveland plant. Earlier this year, he had been promoted to general manager and given the post of chairman of the manufacturing committee.

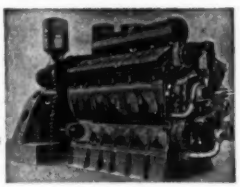
Synchro-Start Names VP

William L. Stelter has been promoted to the position of executive vice president of Synchro-Start Products, Inc., and was also elected to the board of directors.

Mr. Stelter first joined the company in 1943. He started as a draftsman and was later promoted to designer and application engineer. In 1948, he became chief engineer, and was moved up to the post of vice president in charge of sales in early 1952.

DIESEL ELECTRIC POWER

for IMMEDIATE SHIPMENT
Unit Capacities
100 to 1875 Kva A.C.
50-60 Cycles
Various Voltages



Write or wire today for bulletins and complete information regarding these fine fully guaranteed, low cost DIESEL ENGINE GENERATING UNITS. Visit our plants at Sausalito (S. F.), California, and Jersey City, N. J., and see units in operation on our test stand.

"SPECIALISTS IN DIESEL POWER"

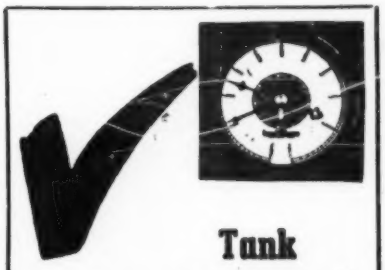
A. G. Schoonmaker Co., Inc.
56 Church St., New York 7, N. Y.

PIONEERS IN DIESEL TESTING EQUIPMENT

For Additional Information Write
AUTOMOTIVE PRODUCTS, INC
1700 Southeast Grand Avenue
Portland 14, Oregon

WANTED G. M. "71"
Discarded injector parts & assemblies. 10 to 1000
interstate diesel service, incorporated
7120 CARNIGIE AVE. • CLEVELAND 3, OHIO

MEN TRAINED
IN PROTECTIVE MAINTENANCE AND GENERAL OVERHAUL
Diesel Engines, Tractors and Heavy Equipment
We specialize in the practical phase of training. Shop Method Home study. If you are employed in this field and need better "Know How", or if you are an Employer and need trained Men, Write Today! INTERSTATE TRAINING SERVICE, Dept. 28-M, 4035 N.E. Sandy Blvd., Portland 13, Ore.



Tank Contents At A Glance

With Liquidometer remote reading fuel storage tank gauges you can check quickly and accurately oil deliveries, consumption and amount on hand. No Diesel plant is complete without one. Liquidometer or Levelometer models are available for tanks of any capacity.

Write for complete information

THE LIQUIDOMETER CORP.
36-24 Skillman Ave., Long Island City, N. Y.

D.P.S. THERMOMETERS

These instruments are a series of marine type thermometers designed for all diesels and all plant uses — water-oil-exhaust.

FEATURES All brass construction, nickel finish, cork insulation.

(Repair service available)

No. 416H $5.00 Ea. Price
No. 426D $4.00 Ea.

33 years continuously in the diesel engine game.

Write for catalog.

DIESEL PLANT SPECIALTIES CO.
Stevens Point, Wisconsin

FOR SALE DIESEL ENGINES

1—McIntosh Seymour Model 4-B-33, 400 HP @ 200 RPM, Ser. No. 1834.
2—McIntosh Seymour Model 4-B-34, 400 HP @ 200 RPM, Ser. No. 1915 and 1918.

Engines will be in operation at Cromwell, Oklahoma until Dec. 15, 1952 and available for removal shortly thereafter.

INTERSTATE OIL PIPE LINE COMPANY
P.O. Box 1349, Tulsa, Okla.
Attn: Mr. J. M. Bradley,
Phone 5-5581, Write or Wire

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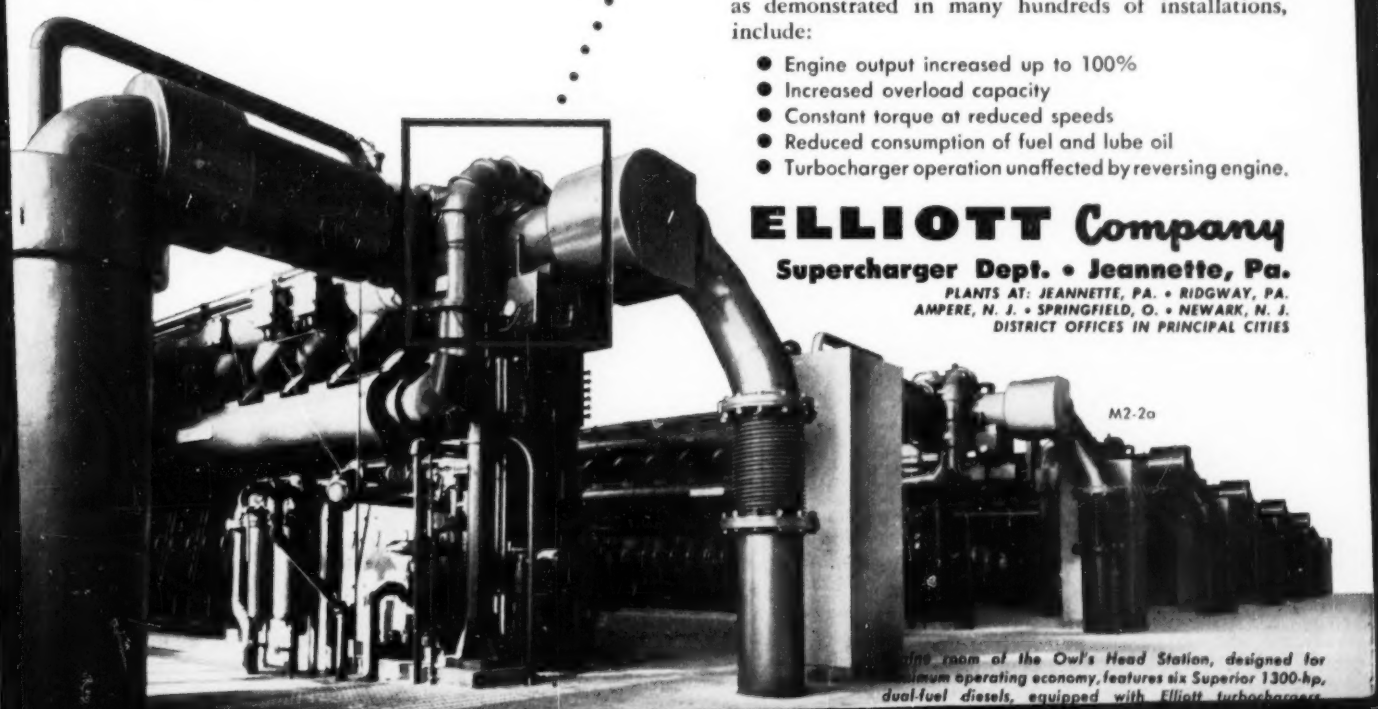

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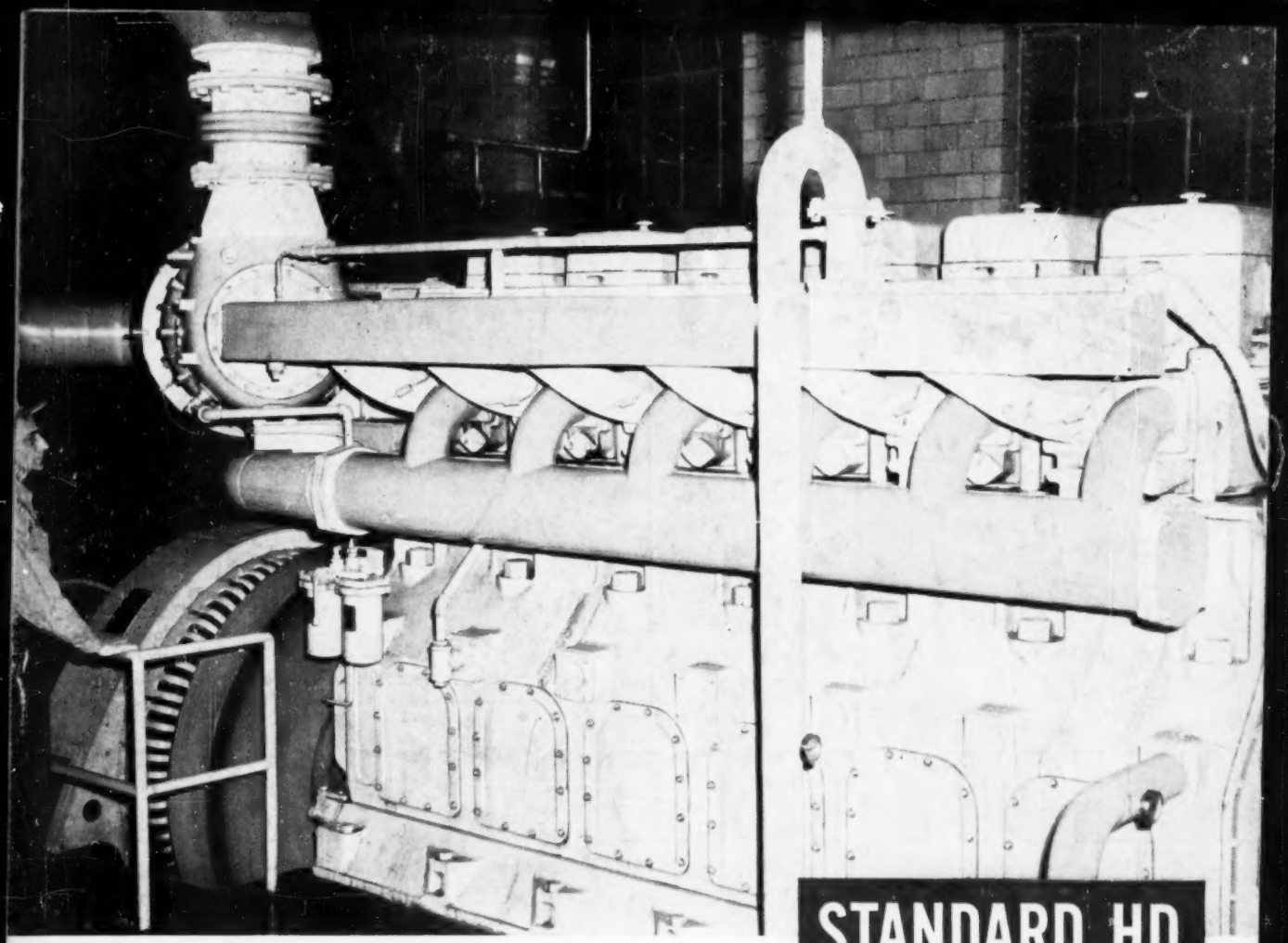

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